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Blake's Stone-Breaker.

THE question of the comparative efficiency of stamps and jaw-crushers for the reduction of ore to fine powder is not yet satisfactorily settled. From the incomplete and one-sided experiments thus far carried out, it would seem that the stamps have the advantage. But it is not yet certain whether a properly adjusted and operated combination of breakers would not secure a superior efficiency and economy. Meanwhile, the great merits of the BLAKE machine as an apparatus for coarse crushing, and especially for preparing the rock for stamps, have become universally recognized. Its strength and capacity are marvellous. Of the former quality, a striking illustration was recently furnished at the Ecton Emery Works, Manchester, England, where a piece of the movable jaw, amounting to about twenty pounds of chilled cast-iron, broke off, and was crushed in the machine to the size fixed for crushing the emery. The accident was discovered and quickly repaired, and the machine has given, here as elsewhere, perfect satisfaction ever since. Mechanics will agree that a method of construction and application of force which such an occurrence could not destroy, must be based on sound principles, and executed in solid style.

The enormous capacity of this machine is notorious. We do not remember ever seeing one in this country, connected with other apparatus, such as stamps, rollers, etc., that was not too much for its adjuvant machinery. At most stamp-mills, the BLAKE crusher now considered as an indispensable part of the plant, stands idle a large part of the time, because it prepares the rock faster than the stamps can crush it. This is the only way in which its use ever becomes other than economical. Experience in England, where this crusher is universally employed, corroborates our assertion, the principal complaint being the inconvenience of removing the ore as fast as it is broken, and consequently the failure to obtain the full advantage of the machine, and the necessity of allowing it to stand idle part of the time, involving some loss in wages, fuel, etc.

Of course it cannot be a valid argument against a crusher, that it performs its work too rapidly. The proper remedy is to bring up other machinery to the same high standard. In spite of these drawbacks, the cost per ton of ore crushed by this machine has been so small as to preclude competition in England; and a recent improvement, which we now propose to describe, will still further augment, in a certain class of cases, the advantages to be realized from its use.

The accompanying illustration represents a BLAKE breaker as employed for crushing copper ores, according to the arrangement devised by Mr. MARSDEN, an English engineer. The power of the machine being sufficient to crush ten tons of the hardest copper ore per hour, and, of course, to deal with a much larger quantity of less stubborn quality, it became most desirable to make arrangements for performing the picking operation with equal speed; and the ingenious and satisfactory way in which Mr. MARSDEN has met the requirements of the case will be readily seen from the annexed engraving. The stone-breaker is fixed in the usual manner, except that when necessary, it is raised a little higher than usual, and to the front of the machine is attached a stout iron bracket, which carries the top bearing of an upright spindle, on which the picking table rotates. Rotation is communicated to the table by band and pulleys, from the same main shaft that drives the stone-breaker, the change from horizontal to vertical rotation being effected, as usual, by means of a mitre toothed wheel and pinion. The size of the table and speed of rotation can, of course, be so arranged as to leave ample time for separating the ore from the refuse. But very little power is required to rotate the table, and the effect of the arrangement is that practically the ore supplied to the breaker is not only broken but thoroughly picked before it leaves it.

BLAKE'S STONE BREAKER, WITH ROTARY PICKING-TABLE

This rotary table is not manufactured or furnished by Messrs. BLAKE. It may be easily constructed in localities where it is required; and we consider it one of many arrangements which could be, and ought to be, devised, for the purpose of bringing out the full capacity of one of the most promising of modern machines. We learn that at the Exhibition lately held in Edinburgh, the medal of the first class for crushing machinery was awarded to BLAKE's stone-breaker, and that Messrs. JOHN TAYLOR & SONS, high authorities on subjects connected with the mechanical appliances of mining, have adopted it, and given the best recommendation in the shape of an additional order on the manufacturers.

THE London *Engineering* says that the steamship "Elba," built by JOHN ELDER, Glasgow, made her first trip to St. Thomas in twelve days twenty and a-half hours, with the average consumption of thirty-three tons of coal per day. On her trial trips she averaged considerably over fifteen knots per hour.

The New Iron Mines in Maine.

A correspondent of the Boston *Advertiser* sends to that paper a description of iron mines lately discovered in the town of Trescott, Washington county, in this State:

"A very high quality of iron ore has been discovered in the town of Trescott, breaking through favorable geological strata of rock. When this crust of rock was penetrated, a bed of iron ore was revealed, turning out to sight a body of ore of higher percentage than the average ores of the world used in smelting. The course of this deposit is northeast and southwest, and, although the surface of the ground is covered with woods and brush, it can be distinctly traced a mile in length, and several hundred feet in width. About two miles across Cobscoot Bay, in a straight line on the course of this vein or deposit, you strike the narrow point of a promontory. This rises abruptly from the water, in a perpendicular cliff about one hundred feet high, and presents upon its face, for the distance in width of a quarter of a mile, an almost unbroken body of iron ore, varying in richness from the highest point which science recognizes, down to the leaner grades of ores, but nearly the entire mass is susceptible of being worked in cupola furnaces into pig iron. This cliff is without doubt the *hanging picture* above ground of the mine at Trescott underground and a continuation of the same.

"Examining one hundred specimens of iron ore from different sections of the country, although you may classify them as specular, magnetic, etc., yet you will find no two alike. And no specimens of a similar ore are to be found in any cabinet of minerals except in the Columbia College School of Mines, where there are similar specimens of ores from the celebrated mines of Elba. So various are the qualities of iron ores that it has been declared that they differ like grapes, according to their locality. The ores of Trescott, Iron Mountain, Missouri, Marquette, Lake Superior, etc., are termed specular iron ores, but they present no marked resemblance to each other. Chemically, they are described as peroxides of iron containing 70 parts of iron and 30 of oxygen. Science, therefore, fixes the maximum point of measure of richness at 70. The average of the Woodstock mine in New Brunswick, worked by English parties, is not over 20; the best ore worked by one of the largest iron works at Pittsburgh, 66; selected Iron Mountain ore from Missouri, 68; Pilot Knob, 60.2

Shepherd Mountain, 68; Marquette, Lake Superior, 57 to 62; the ores from thirteen of the English mines average 48.04, and the highest grade of the Cornish mine gives but 60 per cent. of iron. Three tons of Trescott ore, Maine, taken from 100 feet beneath the surface, for an average, were ground together, thoroughly mixed, analyzed by Dr. CHARLES T. JACKSON, and gave 64.05 of iron and foreign matter of lime and manganese which add to its value. The character of this ore was so unknown in this country that until it was analyzed by Dr. JACKSON, when worked in Messrs. WHELPLEY & STORER's furnace, and converted into steel by the New York Steel Works, and the steel converted into cutlery, it was condemned as plumbago, as containing graphite, etc. The improvements introduced by Messrs. WHELPLEY & STORER in the manufacture of iron by pulverizing the ore, etc., give additional importance to this ore. It is extremely soft and friable, requiring but little power to pulverize it. It requires but one hundred bushels of charcoal to the ton of ore in smelting, while other ores, particularly the harder ores of Iron Mountain, require about one hundred and sixty bushels.

"There are patent furnaces now being erected at Eastport for the working of this ore. They are completed for operation except the trip hammer. The intention is for the present to make iron blooms for steel, but there is ore enough to supply three or four such works."

Bessemer Rails and Tires in England.

From the Report of Mr. SLADE to A. HEWITT, United States Commissioner to the Paris Exposition.

MANUFACTURE OF STEEL RAILS.

IT is usual, as already stated, to cast a ten-inch square ingot for rails. At most works, this is heated in a reverberatory furnace and hammered down to seven inches square. At some prominent establishments, however, this process is dispensed with, and a ten-inch ingot is taken directly to the rolls and rolled down to seven inches. At Crewe, Mr. RAMSBOTTOM employs a heavy cogging machine for the same purpose. This is simply a form of reversing rolls made exceedingly large, and only performing a part of a revolution at each pass of the ingot. It is stated that the rails made from unhammered ingots stand equally good tests with those which have first undergone hammering.

The substitution of rolling, of course, cheapens the manufacture, and reduces the amount of plant necessary, as well as the number of hands required. It is usual, after the ingot has been brought from ten inches down to seven inches, to put it back into the heating furnace for a short time, to bring it up to a heat sufficient to carry it through the remainder of the process. With hammered ingots it is usual to allow them to become cold after hammering, and to reheat them entirely anew, since it is not easy to regulate the heats so as to have the hammer supply hot ingots to the furnaces for the rolling mill. This, of course, involves a further additional expense in the use of the hammer. In heating the ingots care has to be taken that the heat is not forced so as to burn the steel, and ample time must be given for it to "soak." Practically, about four heats are obtained in twelve hours, where with iron seven or eight could be got. When the ingots are rolled from the cast size it is usual to provide larger furnaces, and a greater number for the first heat than for the second, as the fewer and smaller ones will work off the same number of ingots, on account of the shorter time necessary to bring them to the required heat. At the Dowlais works, for example, there are seven furnaces holding seven ingots each for the first heat, and but four holding four apiece for the supplementary heating.

The usual size of rolls for steel rails of the English (eighty pounds per yard) or other pattern, is from twenty-two inches to twenty-four inches diameter. In some cases, however, smaller sizes are in use, as at Crewe, and at the Mersey iron and steel works, at the latter of which only an eighteen-inch train is employed. These, however, are trains which were originally intended for rolling into rails, and have been compelled to do service for steel.

The speed with rolls of the first-mentioned sizes varies from sixty to forty revolutions per minute; the former extreme, however, seems preferable. The drafts on the rolls are made somewhat lighter and more numerous than for iron—say two more grooves for finishing.

At several works, reversing rolling mills have been erected, to avoid the necessity of lifting the ingots in returning, and also to save time by operating on the ingot when moving in either direction. The usual plan has been to effect the reversing by engaging, by means of a clutch, gears running in opposite directions. This necessarily brings a severe shock on all the machinery, especially at high speeds, and in some cases where the arrangement has been introduced, it is not used, the mill always running in one direction, and the rolling being carried on in the usual way. Mr. RAMSBOTTOM has constructed and patented a reversing mill, which he uses for rolling locomotive frame plates, at Crewe, which is free from this objection. He drives his rolls by a pair of engines, resembling a set of locomotive engines in most of their details, and without any fly-wheel. These work at a high speed, and are geared to the rolls in such a manner as to reduce the speed to the required amount. The link motion is thrown up or down in reversing, by a hydraulic piston, easily set in motion by the attendant, and by these means the engines can be reversed seventy times per minute, and entirely without shock. This principle for reversing would appear much preferable to the use of a clutch. The employment of a fly-wheel is not found necessary, as the engines, in virtue of their high speed, contain power sufficient to overcome any obstacles within the limits of safety to the rolls, beyond which it is better that they should stop. Mr. RAMSBOTTOM has adopted in this set of rolls a thorough application of hydraulic power for all the operations of manipulation, and has thereby obtained great facility of working and economy of labor. Instead of the reversing principle, a steam or hydraulic lifting gear is used at some works for raising the ingot to the level of the top of the upper roll, and by many this is preferred to reversing.

The Siemens furnace is coming extensively into use in steel-works for heating ingots. At present they are in operation at Crewe, Bolton, Barrow, the Mersey works, and some other places. They require a certain amount of care in their management, but yield very satisfactory results in their working. They are expensive in first cost, but in districts where coal slack is abundant, they are exceedingly economical in respect of fuel, since they allow of the use of this cheap material instead of better and more expensive coal. But even where good coal must be employed in the gas producers, the utilization of all the heat produced by combustion renders the saving of fuel very considerable as compared with the ordinary reverberatory furnace. For steel, an excessively high temperature, such as is required for some operations, and which alone the Siemens regenerators are able to give, is not necessary, and where much steam power is required it may be quite as economical to employ the waste heat from the furnaces for heating the boilers as to pass it through regenerators for the purpose of heating the incoming gases for the furnaces themselves. In such a case, as much and more expensive fuel might be required for generating steam under independent boilers as would be saved at the furnaces by the use of the regenerators. In this connection may be noticed a plan that has been adopted at the Bolton works with good results, namely, the heating of boilers by gas drawn directly from the gas producers. This, of course, gives the same economy in respect of the use of slack as already referred to. Where sufficient steam is already obtained, or is not required at all, the regenerative furnaces are of undoubted advantage. Mr. WEBB, at Bolton, states that it is still an open question with him, whether it is preferable to heat his boilers, as already mentioned, by gas, or to place them over furnaces fired in the ordinary way with coal.

The sawing, straightening, and punching of rails are conducted in general as in America, with the exception that a single saw, or a pair side by side, instead of two separated by the length of the rail, is used. The length of the rail is regulated by the stops on the carriage, one end being sawed off, and the rail then passed along on the friction rollers in the carriage till it reaches the stop, when the other end is cut off. The use of a single saw, it is claimed, enables the cut to be made at the most suitable point, as indicated by the appearance of the end, and also gives greater facility in varying the length of the rail as required for different orders. At Barrow, the rollers in the saw carriage are driven by friction gearing from the saw engine, so that the rail is passed along automatically; the carriage is also drawn up to the saw by a number of racks and pinions at intervals along its length, driven in a similar manner.

At some works severe tests are adopted for ascertaining the quality of rails, and until more accurate knowledge of the Bessemer ingots is obtained, some such tests would appear to be very necessary. The usual method of procedure is to place a rail from each lot made from one mixing of metal on supports three feet apart, and let fall upon it, midway between them, a weight of one ton, from heights varying from ten to thirty feet, and observing the deflection produced. It is considered that good rails should not break under this test, though they may bend considerably where great height of fall is employed.

The use of steel-headed rails is a point of great importance, but one on which at present little that is conclusive can be said. They have been made to a considerable extent at the Crewe works of the London and Northwestern Railway Company, for use on that line, and Mr. WEBB (formerly of Crewe) has patents for forms and materials of piles for their production. One of the points which Mr. WEBB claims is interposing a layer of puddled bar between the steel face and the fibrous iron, for the purpose of making a more gradual transition between the crystalline and fibrous metals, and thereby securing a more perfect union in the successive layers. The same thing has been done for many years in the United States. In the Exposition specimens of steel-headed rails of French manufacture are shown, which have been struck on the top of the head with a steam-hammer, cracking vertically through both steel and iron, and buckling up the web without any appearance of separation between the steel face and the iron beneath it. Although the specimen gives no evidence of being a selected one, (the line of the weld being plainly marked on the external surface), yet it is clear that no such test can decide a question which can really only be properly solved by experience under the conditions of regular working. A sudden blow may be incompetent to produce effects which may follow prolonged and irregular hammering under the wheels of railway trains. While, therefore, steel-headed rails cannot be pronounced an absolute success, there is every reason for prosecuting the experiment, and reasonable grounds for anticipating a perfectly successful result.*

As the production of rails is at present the largest branch of the Bessemer steel manufacture, the disposition to be made of the crop ends becomes a question of immediate importance, and that to be made of the worn-out rails, one of future moment. As the metal, when it contains any material proportion of carbon, is unreliable when welded, it is not so easy to decide to what use the large amount of ends sawed off from the rails shall be put. At present, it must be admitted they are rather a drug in the market. When an iron that works hot in the converter is used, a certain quantity of these ends may be remelted in the vessel without injury to the steel. About four hundred weight per charge of five tons is considered admissible at the Dowlais works, the scrap being first heated to a red heat in a furnace placed near the vessel, and thrown into the latter before running in the molten iron. It is difficult, however, to dispose of the whole amount in this way. As large a portion as possible is sold to the Sheffield crucible steel-makers, who remelt them, and sell them at a greatly advanced price. At some works, again, they are rolled into small plates, and in this form they may be used for the manufacture of plough-shares and other kindred objects; or, in some cases, they may be rolled and drawn into telegraph wire; it would be impossible, however, to make fine sizes of wire from them. If the difficulty of disposing of the steel scrap is to continue, it forms another argument in favor of steel-headed rails, since these, when worn out, would contain but little steel, and could be readily piled and re-rolled, the pile being so arranged as to bring the steel in the least vital parts of the rail in case its presence should lead to any unsoundness of the welding. It would appear, however, that an adequate market for old rails could be formed by re-rolling them into the form of bars for machinery and other purposes, for which, by reason of their superior strength, they should be more valuable than wrought iron.

* Experiments made in the United States, after a trial of two years, have demonstrated that a perfectly sound weld of the steel to the iron can be secured in the head of the rail.

MANUFACTURE OF TIRES.

Next in importance to the manufacture of steel rails, is that of tires for locomotive and railway carriage wheels. Four years ago it was attempted to weld these up, as in the case of iron from straight bars, but the unreliability of all tires so made was soon apparent, and the attention of manufacturers was directed to discovering some practicable means of producing them without welds. With the exception of the form of the ingot cast for the purpose, the mode of manufacture adopted at all the English works has attained a remarkable degree of uniformity. Mr. RAMSBOTTOM casts his tire ingots in the form of a truncated cone, a usual size being two feet diameter at the bottom, six inches diameter at the top, and thirty inches height. This he hammers on its ends and sides till it assumes the shape of an ordinary flat cheese, with a thickness of about twelve inches. Another heat is then taken on it, and it is then placed under a steam hammer furnished with a pointed conical tool, and by successive blows with this on both sides a hole is forced through the centre of the disk, and this again expanded as the hammering proceeds, till the upper part of the tool, which is flat, comes down upon the tire and consolidates the metal by reducing its thickness. A third heat is then taken, and the ring so formed is placed over a stout beck projecting from the inclined side of an anvil, which maintains the ring in such a position as to give a suitable bevel to the outer face when struck by the hammer, while at the same time its diameter is considerably increased by the operation. After this third hammering it is ready for the rolls, and a fourth and last heat is taken for that purpose. Mr. RAMSBOTTOM holds a patent for the method of punching the tire blocks by a sharp-pointed conical tool without the removal of any of the metal. The form of rolling mill employed by Mr. RAMSBOTTOM is exceedingly complicated, and it is the only one of its kind, as far as the writer is aware, which is in use in England, unless it be at the works of the patentee, Mr. JACKSON, at Manchester.

At Mr. ALLEN's works, Sheffield, (H. BESSEMER & Co.,) the cheese-shaped blocks are produced from an ingot of the ordinary square form, this being cast sufficiently large to form a number of tires, say four, and then hammered round and cut up into sections, each of a weight suitable for one tire. The central hole is punched by flat-ended punches about eight inches in diameter at the lower end, and perhaps nine inches above, driven in from both sides successively, and knocking out a circular disk about two inches thick as scrap. The blocks used with this process are of less thickness, say seven inches. The hole so formed is slightly enlarged by forcing the ring down over a truncated conical block which is placed on the anvil for the purpose, and subsequently another heat is taken, and the hammering continued on the inclined back of an anvil, as already described. The weight of the block can be accurately adjusted by varying the thickness at the time of punching out the central disk, by which means the amount of metal removed will be effected. Another plan adopted by Mr. ALLEN is to cast annular ingots, sometimes a number, one above the other, fed from one gate. These are cast with considerable depth, so as to allow of sufficient hammering to thoroughly consolidate the metal, and the weight is regulated by the size of the central core employed. For rolling the tires from the hammered rings he employs the tire-mill constructed by Messrs. GALLOWAY & SONS, of Manchester, which is the simplest one in use, and gives results probably not at all inferior to those of other more complicated forms. It is the one most generally adopted in England. The only other variation in the tire-making process is, that at some works, for the purpose of avoiding the severe one-sided strain brought upon the hammer by the use of the inclined beck for bevelling the rings, the ring is placed on a stout mandrel supported on a bifurcated anvil, and the necessary bevel is given by a tool of the proper shape, with which the hammer is furnished. In Galloway's and most other tire-rolling machines, the roll spindles are placed vertically and extend to a considerable distance below the horizontal bed of the machine. The rolls themselves are situated just above the surface of the latter, with no bearing above them, the spindles being long and stiff enough to resist all the strain coming upon them. The tire is thus readily dropped over the ends of the rolls and removed when finished. Its diameter is determined by a simple sliding gauge, measuring from the centre of the internal roll to the inner face of the tire at its greatest distance from the former. Bessemer steel tires by the above processes are now made in great numbers, and give good satisfaction in use. There are some who still prefer the crucible steel for this purpose, but the differ-

ence in cost is so largely in favor of the Bessemer metal that it is probable the former will eventually cease to be made.

MANUFACTURE OF BESSEMER PLATES.

The application of the Bessemer process to the production of plates either for boilers or for ships, girders, etc., is one of the most important that could be made. Nevertheless the amount of metal used for this purpose in England falls much below that employed for other purposes. This is due to a certain amount of distrust of steel plates, doubt as to its reliability under varying strains of tension and compression, its capability of being punched and sheared without injury to itself, and of its action under the influence of heat and water as in the fire-box of a boiler. In other countries, as, for example, Austria, as will be shown when we come to speak of the manufacture as carried on in that country, this has not been the case, and large quantities of plates have been produced and successfully applied to a variety of uses.

The secret of the distrust in regard to Bessemer plates in England is, that in nearly all cases the percentage of carbon contained in the metal has been too large. The spiegeleisen used in England is not particularly rich in manganese—seldom exceeding nine per cent. of that element, while it generally contains from four to four and a-half per cent. of carbon. It is difficult, therefore, with such materials to deoxygenate the metal sufficiently without introducing also a considerable percentage of carbon. About 0.4 per cent. of the latter is as large an amount as is proper for plates which are to resist several strains, and though a greater proportion adds materially to the tensile strength of the metal when measured simply by a direct pull, it renders it also much harder and more liable to crack under the treatment to which it is exposed in the ordinary methods of construction. The difficulty in the way of producing good soft plates for boilers or other uses appeared at one time to have been satisfactorily overcome by the substitution of ferro-manganese in the place of the ordinary spiegeleisen. The manufacture of this substance was commenced by a firm in Glasgow as a branch of another business in which they were engaged, and plates made with it as a deoxygenator gave most excellent results. Unfortunately, however, the firm who had undertaken the manufacture, shortly afterward became insolvent, and the patentee of the process has not, as yet, re-established the manufacture (which requires a considerable expenditure for suitable furnaces) elsewhere in England. Had the use of this substance continued for a longer time, so as to make the excellence of the steel produced with it fully appreciated by the public, there would have been a demand for plates urgent enough to have immediately secured the re-establishment of the manufacture; but in the present state of feeling it may not be so easy to induce the necessary primary outlay, especially as a certain amount of ill-feeling is said to exist between the owners of the ferro-manganese patent and the Bessemer interest. The percentage of manganese contained in the alloy produced by the process referred to varied from fifteen to twenty-five. Another kind of ferro-manganese, containing a much larger percentage, and produced in Germany by a different process, also the subject of a patent, has been offered in the English market, but at such an exorbitant price that nobody has ventured to buy it. Still, notwithstanding the absence of ferro-manganese, good soft plates are produced at some works, especially those at Bolton. Messrs. CHARLES CAMMELL & Co. also make a large number of plates of good quality. The following tests, which they guarantee all their plates to stand, are interesting.

Tensile strain per square inch, thirty-three tons.

Forge test (hot.)—All plates one inch thick and under to bend hot without fracture to an angle of 180°, both lengthways of the grain and across.

Forge test (cold.)—All plates will admit of bending cold without fracture as follows:

BESSEMER PLATES.

	With grain. °	Across grain. °		With grain. °	Across grain. °
1 inch	45	25	7-16 inch	90	70
¾ inch	50	30	⅜ inch	110	80
⅝ inch	60	40	5-16 inch	120	90
½ inch	70	50	¼ inch and upwards..	120	100
½ inch	80	60			

To show the comparison of this steel with the regular crucible steel, the guarantee for plates of the latter is also given.

CRUCIBLE STEEL PLATES.

Tensile strain per square inch, thirty-eight tons.

	With grain. °	Across grain. °		With grain. °	Across grain. °
1 inch	50	30	7-16 inch	130	100
⅞ inch	60	35	⅜ inch	150	110
¾ inch	75	50	5-16 inch	180	120
⅝ inch	90	70	¼ inch and upwards..	180	120
½ inch	110	90			

Probably the spiegeleisen used for this purpose is selected with especial care, and may contain as much as eleven per cent. of manganese without an increased proportion of carbon. By a proper system of testing the ingots, as described above, there should be, and is, no difficulty in ascertaining just what percentage of carbon is contained in the metal, and so selecting ingots that are suitable for this purpose. With the superior franklinite that we possess, together with the purer irons, there is, apparently, no reason why we should not produce most excellent plates in large quantities, as is already done in Austria. The manufacture of axles is carried on to a considerable extent, both for locomotives and railway carriages. Locomotive crank shafts are now more frequently made of this material than any other, and with a far greater exemption from breakages. These are usually forged from large rectangular ingots, and twisted to the proper angle, as in the case of iron. To bring these large masses down properly with economy requires very heavy hammers, and to meet this want Mr. RAMSBOTTOM has erected at Crewe a thirty-ton hammer, on his patent duplex principle. In order to dispense with the costly foundations necessary to sustain the impact at the falling tup in large hammers, Mr. RAMSBOTTOM designed about five years since a hammer in which the blow should be struck by two heavy masses mounted on wheels, and moving horizontally in opposite directions, so that their momentum should be annihilated in striking the ingot placed between. In the first of these hammers, in which the weight of each tup was ten tons, the cylinder was placed vertically in a pit beneath the hammer and the piston, connected by inclined links to each tup, so as to communicate motion to them on the rails. The ingot was supported on a suitable table, or between a pair of stout centres, which again rested on a platform capable of being rocked slightly to maintain the ingot always exactly in the centre of the motion of the tups. A number of these hammers are at present in use, and though they constitute the first development of a new idea, they do their work tolerably well, though they need a greater amount of care than an ordinary hammer. In the thirty-ton hammer which has been more recently built, the design has been somewhat modified, and greater simplicity obtained. In this the steam cylinders are horizontal, and placed directly behind each tup, the piston rods being secured to the latter by an elastic packing, so as to relieve the piston from the shock of the blow. To control the motion of the two tups, so that they shall always meet at the same point, a five-threaded screw with a diameter of six inches and a nine-inch pitch, or once and a-half its diameter, is placed beneath them, the thread being cut left-handed at one end, and right handed at the other. A nut secured to the botton of each tup works on the portion of the screw beneath it, and as the screw revolves in its bearings, each tup advances by the same amount. This arrangement is found to work with but little friction, and is not liable to derangement. The valve gear is made to be worked by hand in the ordinary way. The size of the cylinders and pressure of steam are so proportioned as to make the pressure on each tup the same as its weight, and the blow struck by this hammer is therefore the same as would be given by one of the tups falling by gravity through a distance equal to the combined stroke of the two tups, or seven feet. These hammers have been constructed by Messrs. THWAITES & CARBUTT, of Bradford, who have had great experience in this line of business, having perhaps supplied more hammers to the steel-makers than any other firm. With the heavy hammers just described, the large ingots for crank axles are brought down to the required size and shape in a very short time. At Crewe it is usual to put two of these ingots into the Siemens furnaces in the evening, and allow them to heat slowly during the night, but one man being required to be in attendance, and then to work them off under the hammer in the morning before breakfast. In sawing off the ends of his finished axle forgings, Mr. RAMSBOTTOM employs a saw seven feet six inches in diameter, running at about nine hundred revolutions per minute, or a speed on the edge of four miles per minute. The cheeks are also sawed out preparatory to turning the crank wrists.

In concluding the account of the Bessemer manufacture, as at present conducted in England, we may observe that while the amount produced is far in excess of that to be found elsewhere, yet from the close competition between the different makers tending to favor the use of the cheapest materials, and from the naturally rather inferior character of the native iron employed, the quality of the metal is not equal to that produced in countries using better materials. Accordingly the uses to which it has been chiefly devoted have been rails, tires, and axles, together with a certain amount of plates. Notwithstanding this there have been produced, when proper substances have been employed, specimens of the metal which seemed able to undergo almost any test that could be devised. It has been spun into ornamental vessels of shapes such as would bring the most severe strain on the metal without exhibiting any sign of cracking, or bent into the most crucial shapes, with equal evidence of its toughness. We shall see, on examining the product of other countries, that such qualities in the metal are not at all exceptional, but that when steel of great hardness is not intentionally produced, they always exist.

History of the Blow-Pipe.

By JULIEN TROULET, E. M., Wilkesbarre, Pa.

THE tinmen employ, for the purpose of making small solders, a tool called blow-pipe, which consists of a bent pipe ending at one extremity in a very narrow orifice, to be put before the flame of a lamp, and at the other, in a considerably larger aperture, to be placed between the lips and through which they blow. With the help of this blow-pipe, they direct the flame against pieces of metal lying upon a charcoal, heat them strongly and thus melt the alloy which forms the solder.

This instrument had been used in the arts long before it was thought of to give it a scientific application; but to-day, by the studies of numerous chemists and mineralogists, and the modifications afforded by them, the methods of assay with the blow-pipe have been so highly improved as to become of the utmost importance, both in chemistry and mineralogy. These methods presenting the advantage of being very speedy and of requiring few implements, are for these reasons precious to the travelling naturalist and the mining engineer.

As we know from BERGMAN, ANTON SCHWAB, a Swedish counsellor of mines, of very remarkable talents for his time, was the first who, about the year 1738, employed the blow-pipe for the determination of mineral bodies. SCHWAB did not leave any book on the matter, and we are ignorant as to the extent of his investigations.

CRONSTEDT, a Swedish director of mines, who established the basis of chemical mineralogy in a work published in 1758, used the blow-pipe in order to distinguish the minerals. He employed for this purpose fusible reagents or fluxes, producing on the substances exposed to their action, some modifications from which he could derive information relative to the chemical composition of these bodies.

As this chemical composition was the basis of CRONSTEDT'S mineralogical classification, we can imagine what great importance this savant attached to his means of investigation, which he carried to a degree of perfection, altogether the result of an obstinate labor. Still he did not publish any complete treatise on the matter, and confined himself to making known, in his system of mineralogy, the results of his researches, so far as they could be employed to distinguish minerals by special chararteristics pertaining to the various species.

VON ENGESTRÖM published in 1765 an English translation of this system, and later, he added a treatise on the blow-pipe, in which he indicated particularly CRONSTEDT'S way of proceeding, and the chief results of their application to the minerals known at that time. This book, (1) which appeared in 1770, was, in turn, translated into Swedish by RETZIUS in 1773, and afterward into several other European languages.

These investigations, however, were not carried further, and chemists and mineralogists took no more advantage of the use of the blow-pipe than to have a process by which they could ascertain the fusibility of the bodies and sometimes their solubility in borax glass. The reasons of this original stagnation are not difficult to discover. In the first place, it is necessary to have some practice in the use of the blow-pipe, in order to be enabled to produce, without fatigue or danger to health, effects from which a result can be deduced. But this practice is acquired by painful exercise only, to which nobody will devote himself, unless he is confident that the advantages gained will indemnify him for the trouble taken; besides, when the mere mechanical management of the blow-pipe is overcome, it is still difficult to deduce an opinion from an experiment, unless we have already seen a great deal in that line and know how to compare one result to others previously obtained. Before this point is reached, blow-pipe assays give most frequently uncertain conclusions, of the value of which no idea can be formed.

On the other side, though it is possible, by obstinate labor, to become acquainted with the use of the blow-pipe, through mere reading of the books which treat on this matter, real skill cannot thus be obtained, and the lessons of an experienced teacher are required in order to overcome difficulties, the solution of which is sometimes very easy, though the beginner may for a long time have vainly tried it.

Such were the causes working against the propagation of the use of the blow-pipe beyond Sweden. Those who saw CRONSTEDT and VON ENGESTRÖM, operated as they did, and transferred to us the use of the instrument. BERGMAN went further than CRONSTEDT, and extended the employment of the blow-pipe beyond the limits of mineralogy into the domain of inorganic chemistry, where this instrument became in his hands invaluable for detecting in analytical investigations very small quantities of metallic matter. BERGMAN treated with the reagents introduced by CRONSTEDT most of the minerals known in his time, described their action, and improved several of the instruments necessary for his experiments. He published a treatise on this subject, first printed in Latin at Vienna, in 1779 (2), and since translated into Swedish and published by HJELM in 1781.

In these investigations, BERGMAN, whose health did not permit any permanent labor such as this, was assisted by GAHN, who, in his mineralogical studies, had specially devoted himself to the use of the blow-pipe, on account of the rapidity with which this instrument furnishes precise results. The operations he accomplished before the eyes of BERGMAN, who made him examine all the minerals then known, taught him how each of them acts under the action of the blow-pipe. Helped by this experience, he continued to employ the instrument for every kind of chemical or mineralogical investigation; he acquired thus such perfect skill that he was able, by the reactions produced by the blow-pipe, to detect the presence of substances, which, searched for in the wet way, would have escaped notice in the most accurate analysis. For instance, when EKEBERG asked his advice upon the oxide of tantal, recently discovered, of which he sent him a small specimen, GAHN saw that it contained tin, though the amount of this metal was not more than 1-100.

GAHN carried his blow-pipe always with him when he traveled, and every new substance he met with was immediately assayed. It was very interesting to see the rapidity and the certainty with which he determined the nature of a substance which it was impossible to know from its exterior properties. The continual use he made of the blow-pipe induced him to imagine improvements in any thing connected with it, as well for the laboratory as in the field. He examined a great number of reagents in order to find new means to arrive at the determination of some substances, and the whole was conducted with so much sagacity and exactness that the results he obtained can always be implicitly depended upon. The idea, however, to describe the new and general methods discovered by himself never occurred to him, though he toiled hard to teach them to any one who wanted to become acquainted with them. Several foreign savants, who lived with him, made his wonderful skill known to us, but they did not remember accurately his methods, or at least have not published them. (3)

Nevertheless, GAHN consented finally to describe the principal phenomena in the chapter relative to the blow-pipe and its use in the second part of "The Principles of Chemistry," by BERZELIUS; (4) toward the end of his life he induced this same BERZELIUS, his disciple, to note carefully the results offered by the various minerals in the assays with the blow-pipe, results he intended to verify himself. This work, momentarily stopped by GAHN'S death, was afterwards continued by BERZELIUS alone. The illustrious Swedish savant published the book "*Use of the Blow-pipe in Chemical Analysis and Mineralogical Determinations*," translated into French by FRESNEL, in 1821.

So BERZELIUS wrote the first complete treatise on the science of the blow-pipe; the implements he invented and the reagents

he employed are still for the most part used to-day. His book is divided into three distinct chapters.

The first contains the history of the blow-pipe, descriptions of various blow-pipes, of the fuel, supports, accessory implements and reagents, and a study on the methods of blowing and the flame.

The second part is divided into three articles: the first studies the alcalies, earths and metallic oxides; the second treats of the substances resulting from the combination of the combustible bodies, metallic sulphurets and seleniurets, metallic arseniurets, etc., and the third describes the characteristic reactions of the acids in the salts.

The third part of the treatise is a description of the phenomena offered by minerals when submitted to the action of the blow-pipe.

In a supplement of the utmost importance, because it opens the way to investigations not prosecuted since the application of the blow-pipe to the analysis of organic substances, the author gives the pyrognostic characters of the urinary calculus formed by uric acid, urate of soda, urate of ammonia, phosphate of lime, phosphate of ammonia and magnesia, oxalate of lime, silica and cystic acid.

Berzelius really laid the foundations of the science, as he systematized it; first he had even the idea to try the execution of quantitative analysis with the blow-pipe. He applied his theory only to the silicates, but this theory differs essentially from that which originated lately and which, being more mathematical because it proceeds by weighings and direct measurements, is less purely pyrognostic; Berzelius relying upon the more or less complete dissolution of the silicates in the soda salt.

Quantitative analysis with the blow-pipe, working upon small quantities of matter, is evidently important only in the case of pure mineralogy and is of but secondary value for the practical mineralogist and metallurgist. Such analysis will, for instance, never give the mean richness of a portion of ores, a result hard to obtain, even by docimacy, which operates upon considerable quantities. Blow-pipe analysis with the help of scales, such as described in the German books, and especially in Plattner, is perfectly exact in the idea which gave it birth, and which brings it near the ordinary process of chemistry; but it treats of the quantitative determination of the metals, while the methods suggested by Berzelius, applied in different ways to a non-metallic body, silica, open the field to a series of new and very important investigations, the quantitative study of stony minerals. Both orders are distinct from each other by the original idea and by the end they attain. If we are obliged to confess that no research has since been made in the direction indicated by Berzelius, we may also be permitted to hope that the ingenious remarks of the Swedish chemist will become, in skillful hands, the basis for a new theory of quantitative analysis with the blow-pipe.

In the time of Berzelius, only one physician in Europe made a thorough study of the use of the blow-pipe, and submitted to experiment a great number of mineral substances. This was H. B. de Saussure, celebrated by his geognostic investigations of the Swiss Alps. De Saussure, like Cronstedt, used it especially in order to recollect and distinguish minerals; but in spite of the additions and important improvements he introduced, he remained, according to Berzelius, far behind Gahn in the results he obtained with this instrument. He devoted himself particularly to the valuation of the temperature required for the melting of several substances, judging from the facility with which small lumps of the bodies would melt. (5.)

Among the other savants who have enlarged the importance of the blow-pipe, are Baillif, Smithson, Turner, Harkort, Kobell, Plattner, etc. Harkort first employed the blow-pipe for quantitative analysis of silver, and Plattner extended these methods to the quantitative evaluation of copper, lead, bismuth, tin, nickel, and cobalt; since then, quantitative assays of gold, iron, and chromium have been made.

The most complete treatise ever written on the blow-pipe is that of Plattner, revised and enlarged by Theodore Richter. (6). This book, in which the methods in the wet way are employed, together with those in the dry way, has been translated into English by Dr. Sheridan Muspratt, and into Spanish by the Earl of Moriana, but these two translations are now exhausted. The latter has the following title: "Arte de ensayar con el soplete cualitativa y cuantitativamente los minerales, aleaciones y productos metalurgicos, por C. F. Plattner, professor de la Academia de Minas de Freiberg; publicado en Ingles con un apendice De Berzelius acerca del modo de ensayar los calculos urinarios, etc., por el Dr. Sheridan Muspratt, traducido al castellano de la segunda edicion Inglesa, con vista de la primera y ultima alemanas por D. Ignacio Hernandez de Henestrosa conde de Moriana. Madrid, 1853." As is seen, it is a rather incomplete Spanish version of Muspratt's English translation.

We have to observe that by the introduction of the wet way, Plattner seems to alter somewhat the special character of the assays with the blow-pipe, which are essentially analyses in the dry way; he has, however, solved the problem so important in science and industry, namely, to execute analytical chemistry with limited and portable implements.

Berthier, in his "Traité des essais par la voie sèche," (7) devoted a special chapter to the various instruments and operations employed in investigations with the blow-pipe, and gave, in the particular study of every metal, the most important reactions concerning its ores. Nevertheless, this subject occupies but a short portion of Berthier's work.

(1.) An essay towards a system of mineralogy, by Cronstedt, translated from the Swedish by G. von Engestrom, revised and corrected by Mendez da Costa. London 1770.

(2.) T. Bergman. Comment. de tubo ferruminatorio ejusdemque usu in explorandis corporibus presertim mineralibus. Vindobonæ, 1779.

(3.) Professor Haussmann alone gave an extensive account of the services done to science by the blow-pipe of Gahn in a note published in Leonhard's *Mineral Taschenbuch* for the year 1810.

(4.) Larbok i Kemien, 2; dra Delen, Stockholm, 1812; page 473 and following.

(5.) H. B. de Saussure; Recherches au chalumeau. Journal de physique. T. II. p. 1.

(6.) Carl Friedrich Plattner's Probirkunst mit dem Löthrohre oder Vollständige Anleitung zu qualitativen und quantitativen Löthrohr-Untersuchungen—neu bearbeitet and vermehrt von Theodor Richter. Leipzig, 1865.

(7.) Berthier.—Traité des essais par la voie sèche ou des propriétés, de la composition et de l'essai des substances metalliques et des combustibles. Paris, Thomine libraire, Rue de la Harpe, 88—1834.

MINING SUMMARY.

The Sutro Tunnel.

The recent heated debate in the House on the subject of the Sutro Tunnel has brought that enterprise once more into public attention. The bill before the House was one which released the Comstock companies from the obligation to pay royalty to the Sutro Company after the completion of the tunnel—an obligation which, the companies claim, is no longer binding upon them under their contracts, but has been, unfortunately for them, incorporated into the general United States mining law. The mining committee reported adversely to the bill, and Mr. Sargent, from the same committee, made a minority report in its favor. The debate was shared by Messrs. Sargent, Fitch, Voorhees and Axtell, for the bill, and Messrs. Ferris, Strickland, Kerr, Woodward, Blair, Biggs, Kelley and others, against it. We give a few extracts from leading speeches on both sides, and refer the reader to our editorial comments on another page.

Mr. Sargent: The original bill giving a grant of land and certain privileges to Adolph Sutro and his assigns provided, among other things, that Mr. Sutro should have a royalty of two dollars a ton upon all rock that should be taken out of the Comstock lode by certain companies which were mining upon that lode after he had got his tunnel in to a certain extent and in a certain condition, whether that rock was taken out of his own tunnel or drawn to the surface by the hoisting-works of the companies. Prior to that time a contract had been made with Mr. Sutro by some of the companies upon the lode, wherein they bound him positively that he would within a certain length of time commence three shafts for the purposes of this tunnel, and have certain other work done upon the tunnel; that he would get subscriptions to the stock of the company to the amount of a certain number of millions of dollars as a guarantee of his good faith and of the early completion of the tunnel. While that contract was in force, and before the expiration of the time within which these conditions were to be performed, Mr. Sutro came to Congress, and with his peculiar ability for representing his case in the strongest light to members personally, induced Congress to pass an act declaring that the amount of compensation provided to be paid to him in these contracts should remain a tax upon the companies forever, no matter whether he performed his part of these contracts or not. That was the logic of the act of Congress which was passed; and to show that I am correct in this I call attention to the fact that the press of this district a day or two since, in commenting upon the action of the Committee on Mines and Mining, stated that the proposition to repeal this section had been voted down in that committee, leaving me in a minority of one, and that thereby there was confirmed to Mr. Sutro forever the right to charge two dollars a ton on all rock which may be taken out of that lode. After that act was passed, and when Mr. Sutro himself evidently did not dream of this construction to be put upon it; when even he did not suppose that it released him from the necessity of complying with his part of the contract and finishing the tunnel within a certain length of time, he went to those companies and procured from some of them an extension of the time during which the contract should run. But the original time expired and the extended time expired, and the companies, when they applied under the mining law of 1866 for their patents, found that the law contained a provision that they should not have a patent for a single claim unless the patent contained a provision imposing this immense tax on them for all time. But before that construction of the law had been made the companies, in consequence of his delay in finishing his work, which up to the present time is scarcely more than commenced, and until within a few months not commenced at all, had gone on and erected upon those claims heavy machinery, whereby they went down deep into the bowels of the earth and made the developments which it was said this tunnel would accomplish. They found among other things that there was no water down there to be drained out by this tunnel. It was found also that when shafts were extended perpendicularly into the earth and connected with the drifts extending horizontally, a strong draft was created, making the air down there as cool as upon the surface of the earth—so much so that visitors to the mines were cautioned not to sit down, lest they might take cold; and throughout the mines gates are put across these shafts and drifts, in order to prevent a too strong current of air, by which the candles of the miners might be blown out and their work incommoded. By these developments the original objects of the tunnel were shown to be fallacious, that the tunnel was not necessary for the purpose of draining off water or for purposes of ventilation.

Mr. Fitch: The mines upon the Comstock lode are worked by means of perpendicular shafts, from which at different levels drifts are run along the lode which contains the silver-bearing quartz. The ore when excavated is placed in small cars running upon tracks at the bottom of the drifts and taken to the main shaft, where it is hoisted to the surface; from thence it is transported to mills, where the silver is extracted. These mills are situated at different distances from the mines, from a hundred yards to fifteen miles away. The mills at a distance are in the vicinity of forests where wood can be cheaply obtained. These mills are generally situated upon streams which furnish without expense water for the various uses for which water is needed in a quartz-mill. The mills situated near the mines are obliged to pay a high price for water, and to bring wood at a great cost from a distance of from ten to twenty miles. The expense of hauling the quartz rock in one case is about the same as the expense of hauling wood and purchasing water in the other. Thus, whether the mill be near the mine or a dozen miles away, the expense of reducing the ore is about equal. Now, in 1865 the various shafts upon the Comstock lode were down about five hundred feet. The companies were put to a great expense to pump the water out of the mines, which water increased in quantity as the shafts descended; and in consequence of a want of communication between the shafts by drifts under ground the miners suffered to some extent from want of ventilation. At this juncture Mr. Adolph Sutro proposed to construct a tunnel which should be commenced near the Carson river, two thousand feet below the mines, and about seven miles distant, which tunnel should run in a direct course under the mountain and cut the ledge at a depth of eighteen hundred feet, from which point the tunnel should be extended, or another tunnel constructed, north and south along the front of the ledge. The alleged advantages of the tunnel were that the mines would be drained by it, and the great expense of pumping and pumping-machinery avoided; that the air would enter the tunnel and find its way to the surface through the various shafts as through chimneys, thus ventilating the mines and saving the cost of ventilating-tubes and machinery; that the mines could be worked through this tunnel more advantageously than from the surface, because the ore could be tumbled into the tunnel, there placed upon cars and transported at small expense to the Carson river at the mouth of the tunnel, where mills could be erected; and that by means of this tunnel it would be demonstrated at small expense to the companies mining upon the Comstock lode whether the silver-bearing quartz of that ledge extended to a depth of eighteen hundred feet, as was very generally supposed. Sir, the magnitude of the project appealed to the adventurous spirit of our people; its practicability and advantages were plausibly urged by its projector. A charter was obtained from the Legislature of Nevada granting the right of way and some other privileges to Mr. Sutro and his associates, and by that persistence and that way of stating his case, which are his distinguishing characteristics, Mr. Sutro succeeded in inducing the companies mining upon the Comstock lode to enter into contracts with him for the construction of the tunnel, on the faith of which contracts he claimed to be able to procure the capital requisite to construct the tunnel. It will be seen from the provisions of the contract that the companies agreed to pay Mr. Sutro the large royalty of two dollars a ton on all ore extracted from their mines, whether it should pass through that tunnel or not, after the tunnel had reached a point five hundred feet distant from the west wall of the Comstock ledge. But they required the tunnel to be commenced on the 1st of August, 1867; they required him to commence it not merely at its mouth, but at six other points; to commence it by means of drifts to be run from the bottom of three shafts to be sunk between the mouth of the tunnel and the Comstock lode, which shafts were also to be commenced by August 1, 1867. Once so begun, the work was to be prosecuted with diligence. The assault once commenced upon the rock-ribbed fortress wherein nature had buried her treasures was never to cease until the garrison surrendered. They surrounded their great concession with every possible guarantee and safeguard. They required him not merely to commence the tunnel at the time and in the manner demanded by the contracts, but they required him to obtain from responsible parties subscriptions to the stock of the tunnel company amounting to the sum of $3,000,000 by the 1st of August, 1867, of which some $300,000 were to be actually paid in cash. They required him to expend not less than $400,000 the first year in prosecuting the work. They said, as plain as language could say, that the very purpose of the bargain was that the tunnel might speedily furnish them with that draining, that exploration, that ventilation, that facility of transportation they would otherwise be compelled to obtain by means of expensive machinery for hoisting, pumping, and ventilating, and expensive railroads to be constructed upon the surface from their mines to wood and water. The companies did not give Mr. Sutro a franchise for the purpose of speculation or exploration. They did not give him a right to commence a tunnel at any time within a decade and complete it at any time within a century, and bind themselves and their heirs irrevocably to pay him two dollars per ton upon all the ore taken from their mines, whether that ore should come through that tunnel or not. Time, as will be seen, was the very essence of the contract, so far as the companies were concerned. Time was the central idea, the pivotal point of the transaction, and no man who reads those conditions in those contracts, and who believes that the companies mining on the Comstock lode were other than corporate lunatics, idiotic entities, would believe that they agreed to give, or did give, or ever consented that Congress should give to Mr. Sutro the enormous franchise of commencing that tunnel at his leisure, prosecuting it at his leisure, and compelling them to pay two dollars a ton on all their ore, if—and whenever and however—he should conclude to undertake it. Since that time there has been constructed, by means of aid granted by several counties in Nevada—whether wisely granted or not I do not say—a railroad from the mines to Carson, a railroad twenty miles long, for the construction of which the companies made large advances, on which railroad the ore is now carried to the mills, and wood and water brought to the mines at a greatly reduced cost. Since that time they have erected new and expensive machinery at the mines for pumping and ventilating and sinking shafts. Since then they have sunk shafts to a point within a few hundred feet of the proposed level of the Sutro tunnel, and have demonstrated the unpleasant fact that the ore deposits of the Comstock ledge do not grow in value or even continue their value as the ledge descends. By means of drifts run between these shafts they have secured a tolerable ventilation of the mines, and the developments of the pits have overturned the theories of science, for below seven hundred feet, water in considerable quantities exists no longer. In most cases drainage facilities are not now needed. In some of the principal mines of the Comstock lode they have not water enough for their necessary use. I know that in a pamphlet circulated here, a quotation has been made from an article in a newspaper published at Virginia City in which it is stated that there is a large amount of water in the Ophir shaft. That quotation is disingenuous and intended to deceive, because the Ophir shaft referred to is a new shaft not connected by drifts with any other shafts, and has not yet gone below what I will designate as the water belt. Now, after these developments, made at the expense of the companies, have shown that the tunnel is not necessary for the purposes for which it was originally supposed to be necessary, Mr. Sutro comes forward with his great national work dwindled, so far as the necessities of the companies mining on the Comstock lode are concerned, to the dimensions of a great private speculation, and demands tribute of these companies; demands that they shall pay him, under this construction of the act of Congress, two dollars a ton on all the ore taken out of their mines, if he concludes to run this tunnel at any time at his leisure. Sir, the companies feel that there is no equity, that there is no justice, that there is no decency in the demand of Mr. Sutro. In the days of their prosperity, when labor was high and transportation expensive, and the cost of reducing the silver ore about double what it is now, they passed by millions of tons of low-grade ore lying within a few hundred feet of the surface. The developments made at their expense have shown that this ore is now their main resource, and they are returning to it and endeavoring to work it. The construction of a railroad, improved machinery, and the reduction of the cost of living, enable them now to work this ore at a profit of two to five dollars a ton. If the Sutro tunnel were completed to-day that part of their mines where this ore is situated would not be drained and ventilated by it, nor would the ore be transported through it, nor

would the tunnel be in anywise a benefit to them ; yet if the tunnel is constructed they will have to pay the royalty on their ore, whether they use the tunnel or not. In this view of the case these companies may perhaps be pardoned for congratulating themselves that Mr. Sutro did not commence the tunnel within the time prescribed by the contracts; they may be pardoned if they congratulate themselves that they carefully guarded, protected, and hedged their interests in making these contracts. But, now, behold, Mr. Sutro comes forward in October last, three years after the time when he was required to commence the tunnel under the contracts, and commences in a feeble manner a sort of hole in the ground. He does not commence at the place nor in the manner specified, but he expends a very few thousand dollars, not to exceed $5,000, of somebody's money upon it, and upon the basis of some right which he supposes he has acquired in consequence of that act, he comes to the companies and says, in effect: "You must settle with me ; I have no claim upon you under these contracts which I have failed to fulfil, but Congress has given me a claim upon you by law, and you must pay me tribute; I propose to run this tunnel; Congress has said that if I choose to run it at any time within a hundred years you have to pay me two dollars a ton on your ore ; I propose to run it whether you want it or not, and whether it is necessary or not, in order to avail myself of the royalty imposed by Congress; you may settle with me, gentlemen, but in the meantime you hold the title to your mines subject to the depreciating cloud that I may construct that tunnel." This is not right. The companies never contracted for it ; Congress never intended it. It is a flagrant outrage upon the property rights of our citizens. The delegation in Congress from Nevada, her Senators and Representative, and most of the Senators and Representatives from the Pacific coast, now ask Congress, not to deprive Mr. Sutro of any rights he may have acquired under that contract, but to so amend and modify this Sutro tunnel law that it may conform to and sustain, and not overthrow, the Sutro tunnel contracts.

Mr. FERRISS—Mr. Speaker, there seems to be a good deal of misunderstanding in regard to the facts bearing upon the question before the House. I have listened with pleasure, in one sense, to the eloquent gentleman from Nevada. [Mr. Fitch]; but I was much surprised at his perversion of the facts. I at first thought that I would answer the equitable argument which the gentleman has presented to the House. But upon reflection I think it would be better at this stage of the discussion, as the debate must go over to the morning hour to-morrow, simply to state the facts in regard to the passage of this law, the third section of which it is sought to have repealed, referring to the agreement which has been mentioned, and also to a law of the Territory of Nevada passed about the same time.

The gentleman from Nevada [Mr. Fitch] talked about the right which the owners of these mines have acquired. Up to the passage of the Sutro Tunnel Act, as it is called, the third section of which gives a royalty to the constructors of the tunnel in case they drain the mines—up to that time there was no law upon the statute-book which gave any man in this country a right to one single foot of mining land, with the exception of a small quantity of lands in California, the right to which was acquired under the Mexican title, so called. In all other cases every occupier of every foot of the mineral lands was merely a squatter. All the title he had was a mere license, a mere privilege granted by the Government. What was the result of this? The miners among themselves, for the purpose of facilitating their own business, made their own codes, rules, and regulations. And in the absence of any legislation it became necessary, in adjudicating upon difficulties between them, for the courts to pass upon those rules and regulations, which became in the process of time, and were so regarded by the courts of California and other mining States and Territories, as law for the time being. But, sir, so far as the title to all these lands is effected there is no law, either of the General Government or of the States or Territories, by which any person could acquire a title to a foot of these mining lands.

Well, sir, that was the condition of things when this Sutro tunnel bill was passed. It was passed on the 25th of July, 1866, and the day following we passed the first law that was passed by Congress, giving anybody a right to acquire title to a foot of this land ; so that at the time that the Sutro tunnel law was passed, which was one day previous to the passage of the general mining law, as it is called, Congress held every foot of mining land, and could impose just such conditions as it saw proper upon parties acquiring title to those mines. The Government owned the mines, and these parties were mere squatters and were occupying the lands by the allowance of the Government. Mr. Sutro and his associates—and it is well to recur to the names of the trustees of the Sutro Tunnel Company, for some of them are familiar to members, and the first is William A. Stewart—were the parties named in the agreement referred to ; but when the act was passed, Mr. Sutro was named as the only grantee to this enormous privilege which the gentleman from Nevada [Mr. Fitch] has alluded to.

Now, sir, of the importance of this tunnel I have not time now to speak. It will be the subject of discussion before this bill is disposed of; but I will say that it is of a magnitude which gives it a national importance. The history of mining in all countries, not only in Europe, among the enlightened nations there, where mining has been carried to its utmost perfection, but in Mexico and everywhere else, has demonstrated this important fact, that mining at a great depth cannot be successfully and profitably carried on without the construction of deep adits or tunnels for draining and ventilating purposes. That is the history of mining the world over ; and the importnnce and absolute necessity, in order to save these mines upon the Comstock lode from abandonment, of the construction of this tunnel has been demonstrated not only by the history of mining in other countries, but by the facts made apparent in regard to this very mining region. In this act, which was passed, no allusion whatever was made to the contracts to which the gentleman has referred and which have been drawn in here as a sort of side issue, except in the third section, which simply provides, instead of saying that the miners whose mines are drained by this tunnel shall pay a royalty of two dollars a ton for every ton of ore taken out of their mines, that they shall pay the price agreed upon by the majority of the parties representing the mines upon this lode in the agreements which they have made with Mr. Sutro. It is simply another way of saying that they shall pay two dollars a ton royalty for every ton of ore taken out of the mines drained. The gentleman from Nevada has talked about its being an oppression to the owners of these mines ; he tells us that these mines below a certain depth are not troubled with water. Well, sir, I apprehend that the facts are entirely different, and that in California and Nevada, as in other sections of the country, water is to be found below the surface of the earth, and until they can find some other power better than gravitation to move heavy bodies, they will never find a good substitute for tunnels to drain the mines. The man who discovers an improvement upon gravitation in drawing the water off will be the same fellow who expects to lift himself by tugging at his boot-straps. These mines notwithstanding the assertion of the gentleman from Nevada, I am credibly informed by gentlemen who have been in them, are now many of them not filled with water, but partially filled with water, for the removal of which powerful engines are kept constantly in operation, and thus with the utmost difficulty the water is kept out of the mines, so that they can be successfully worked.

Now, if this were simply a question of equity, to be determined upon the construction of the contracts, and if we were going as a court to determine whether time is the essence of the contracts alluded to, it is idle to suppose for a single moment that the owners of these mines would not receive not only full value for the draining of the mines, but double and treble what they would pay for it. If these mines were drained by this tunnel, more than fifty engines that are now kept in operation for the purpose of pumping the water out, at an expense of twelve dollars a cord for wood for fuel, would be useless. But there is something more in this. If it were an original proposition to give Mr. Sutro the benefit of this royalty for the construction of this tunnel, notwithstanding the assertions of the gentleman who made the minority report, the Committee on Mines and Mining would report favorably upon it.

Mr. KERR—Mr. Speaker, after a careful examination of this question I have reached the conclusion that it is the duty of the House to leave the legislation on this subject as it now stands, and to deny the prayer of the minority of the Committee. I am led to that conclusion, in the first place, by the reflection that this whole subject was referred very properly by this House to one of its most intelligent committees, consisting of nine gentlemen, eight of whom report to this House that this proposed legislation is not proper to be enacted; and the minority, consisting of only one member, asks its passage. In addition to that, my own judgment is that upon its merits this bill ought not to be passed. I think that in the original proposition there was nothing wrong, nothing unjust, nothing oppressive, nothing that in any of its characters and incidents is extraordinary, and is intimated by the honorable gentlemen on the other side. It is said that the old law organized a monopoly in Nevada. I do not understand that it does any such thing or bring about any such result. This tunnel idea stands upon a very common one in application to various other subjects throughout the country, and it is only by the name that is given to it in Nevada that the people are misled and do not understand just what it means. The country is everywhere familiar with various systems of ordinary sewerage and drainage in cities, towns, and the country. The obvious principles of law, of just and fair contributions for common advantages and benefits, on which they are maintained, are well understood. There is no character of monopoly or uncommon hardship about them.

Now, Mr. Speaker, the whole of this law consists in this simple proposition, that here is to be constructed a sewer, if you please, a drain that will inevitably benefit every owner whose property is in any way reached and drained and ventilated by it. In this city of Washington and in all the cities of this country it is a common practice to require the persons who derive advantage from the construction of such works to contribute to their construction originally and to their maintenance thereafter.

Mr. FITCH—Did the gentleman ever hear of a case where a sewer was constructed and the owners of property adjacent to that sewer were compelled to pay for it when none of them wanted the sewer and all of them opposed its construction ?

Mr. KERR—I have heard of just such things. I have often heard of just such things in cities and sections of this country. I know of just such a thing in my own experience. But that is not this case, and therefore the gentleman's question has no pertinency to this case. This tunnel company was organized at the request of these miners, at the request of the Senators and Representatives from the State of Nevada, at the request of the Legislature of Nevada, at the request of the Governor of Nevada and of all the people of Nevada, in all the forms in which they could make their wishes known to Congress. I believe that this identical law that it is sought now to repeal was drafted by the hand of Senator Stewart, of Nevada, and that it was supported two or three years ago by the entire representation from the State.

But it is very clear, Mr. Speaker, that while gentlemen say here that these people had a possessory right in this soil before this last law was passed, they utterly destroy the value that is in that position when they also say that the mines involved in this legislation have very great value, and that out of these mines these same miners have already extracted $100,000,000 in precious metals. Now, if that be so it seems to me that for that shadowy, that unreal, that executory—it is not that much in law—that mere possessory claim of right, they have been most munificently paid, and ought not to come back here and ask for more. But a further answer to their position is found in the fact that when the original application to Congress was made these miners themselves went to work and executed these voluntary individual contracts with this tunnel company, by which they agreed, whenever the tunnel was constructed, to contribute these several sums to aid its construction and maintenance.

Mr. WOODWARD—When I came here in 1867 as a member of the Fortieth Congress, the then Speaker of the House placed me upon the Committee of Mines and Mining, and the question of this Sutro tunnel was, during that Congress, fully examined by that Committee. I then for the first time made the acquaintance of Mr. Sutro. I then learned all that an intelligent man like Mr. Sutro could explain to a comparatively unintelligent committee in regard to the whole subject of tunneling the Rocky mountains. The immediate question before the committee at that time was whether the Government should pledge its faith to the extent of $5,000,000 to this company in aid of the tunnel. A bill which was prepared for that purpose was referred to a sub-committee, of which I had the honor to be a member. I took the ground that the Government was not in a condition either to advance $5,000,000 of money out of the Treasury or to pledge its faith for that amount. Hence, I was opposed to the feature of the bill embracing that proposition. The majority of the sub-committee reported to the committee in favor of the bill ; and a majority of the committee reported favorably to the House, my friend from Kentucky, [Mr. Knott,] the chairman of the committee, [Mr. Higby,] and myself being the only dissenters. On the final report to the House the committee stood six in favor of the bill and three against it. That bill, so far as I know, never came up in the House, But, sir, Mr. Sutro at that time came before the committee with the indorsement of the Legislature of Nevada, with resolutions complimentary of himself, with a petition urging Congress in the most earnest terms to pledge the national faith in aid of this tunnel. The measure was pressed upon Congress, so far as it was pressed at all, by all the power that Nevada could concentrate in support of it. The law of 1866 had already been passed the year before ; and this application of the Legislature of Nevada was founded upon the legislation of 1866.

Well, sir, yesterday we had an extraordinary spectacle on this floor, when the only Representative of the State of Nevada denounced that legislation in the most violent manner as improper and dishonest. The act of 1866 looked to the commencement of the greatest work of internal improvement that has ever been contemplated in the State of Nevada. It was legislation which was calculated to develop her mineral resources to a greater extent than anything else that has been proposed. This legislation was yesterday denounced on this floor by the Representative of the State of Nevada as dishonest and corrupt. Now, Mr. Speaker, I say that my eloquent friend from Nevada, in opposing this bill, manifestly does not represent the State of Nevada. He says that he does not represent the "bank ring." I do not know that anybody charges him with doing so. But he does not represent the State of Nevada or else the documents which we had before our committee for a whole year were forgeries.

Mr. Sreaker, this argument addressed to us by the Representative from Nevada founds itself on one single legal objection, to wit, that Mr. Sutro did not commence his tunnel within the time stipulated in the contracts with the companies. When the gentleman was urging this point, the gentleman from Ohio [Mr. Van Trump] put to him a most pregnant question, whether that was not a question for the courts rather than for Congress? Certainly, sir, it is a question for the courts. When these companies are called upon under their contracts let them take whatever advantage they can of this quibble. But then they will meet as one of the facts bearing on this question the telegrams that were sent to New York and to this city to hinder and delay the work beyond the time within which they themselves had stipulatated it should be commenced. Sutro was bound under the contract to commence his work in 1867. Owing to pecuniary embarrassments he wanted more time, as is so frequently the case with railroads and canals and all great works of internal improvement. He applied to these companies to give him more time. They agreed to extend his time one year, which would be until September, 1868. Before that year was up, to wit, in January, as I am informed, the very companies who did agree, or some of them, joined in this telegram repudiating that extension, and that six months before the time had expired to which they had extended it. They complain, through their Representative upon this floor, that Mr. Sutro did not commence his work in time. I say when that question gets into the courts and becomes a judicial question these other facts will bear on this question, and the judge or chancellor will ask, if time is the essence of the contract, the other party, "How have you treated that question?" If it be found that they have thrown obstructions in the way of Mr. Sutro, prejudiced the money market against him, and embarrassed him at every step of his progress, the equity of this special technical defence will not be very impressive. There is not much in that. If this House is going to legislate on this judicial question I insist on it that these questions of fact which the gentleman intimates I have not stated correctly, bearing on the question whether time be the essence of the contract, shall be investigated by the House; that we shall go into them in order to act intelligently on this judicial question. But what is better is to defeat this bill, as the committee recommend us to do, and leave these parties under these contracts to their legal rights, as they shall be adjudicated in the courts, Now, Mr. Speaker, if this law of 1866 had not been passed when we were deliberating on this subject in 1867, most assuredly that committee would have been almost unanimously in favor of such a law.

Mr. FERRIS, in closing the debate said—This, Mr. Speaker, is a question of the plighted faith of the nation, and it is for this Congress to determine now when they have given Mr. Sutro this franchise, and when by the terms of the contract, on which so much stress has been laid, he has at least twelve years to complete the work, whether they shall withdraw what they have given, or shall tell him to go on and complete the work which he has commenced in good faith. I think it is the duty of this House at this time not to turn its back upon an enterprise which for magnitude assumes national importance, which is undertaken in good faith, and which, if Congress will stand by its plighted faith, will bring to its aid capital sufficient to build it long before the expiration of the time limited by these very contracts.

Arizona.

The Prescott *Miner*, March 5, chronicles with great satisfaction the substantial success of a recent run of the Big Bug mill in its locality. It says: "They have demonstrated, yes, proved beyond a doubt that quartz mining can be made to pay handsomely in these mountains, and to them is due the honor of making the first real substantial success that has been made in this part of the Territory. Of course, the Vulture company, near Wickenburg, have been making money by working quartz, for several years past, but their mill and mine is nearly 100 miles southwest from Prescott. The Big Bug mill consists of but ten stamps, yet it has ground out an immense amount of gold in the past two months. The latest run paid better than any previous run of which we have any knowledge. The stamps were run about ten days, and the amount of gold saved was about eight pounds, worth at least $1,700. The mine, we are told, is looking finely. The superintendent, Mr. McCarthy, thinks there is now a sufficient quantity of ore in sight to keep the mill constantly crushing for two years. But we understand the owners intend to erect more stamps soon, and 'get away' with this visible body of ore in less than a year. We earnestly hope they will do so ; there is enough rich quartz in the district to give employment to fifty such mills as the Big Bug for a long time to come. About two miles north of the Big Bug mill, there is a large, rich and well defined lode known as the Independence, upon which work has recently been commenced anew by its owners, L. C. Gray, T. W. Boggs, and A. L. Moeller. It is their intention, we believe, to sink down on the lode some fifty or sixty feet and have the ore taken therefrom crushed at the Big Bug mill, and should it yield as well as is anticipated, work will be kept up and pushed with greater vigor."

New Mexico.

MORENO.—The *News* gives this item: "Frank Daniels has just completed a 25-stamp steam quartz mill. He employs sixty men in the running of the mine and mill. Mr. Maxwell is running his mill successfully."

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19, tf.

MARKET REVIEW.

The Coal Trade.

NEW YORK, April 14, 1870.

ANTHRACITE.

WHOLESALE.—The market this week shows less animation than at the time of our last writing. There is, however, a fair demand, and prices are well sustained. The large companies note that their product is taken as fast as it comes to hand, and we hear of no cargoes of any kind on the market. Lehigh coal is very scarce. There is no doubt but that the present quotations will be maintained during this month, or at all events until Schuylkill gets to work. The situation in the Schuylkill region remains unchanged; the operators have taken a firm stand for their rights, and mean to be successful. There is no question but that they are in the right, and we are surprised that the pig-headedness of a few of the W. B. A. should lead the majority so blindly against their interests. The basis of 1869 cannot be adhered to for 1870 and keep Schuylkill county in the market. We were afraid that the present show of an advance in prices here might lead the operators to "give up the ship." We are satisfied that the present prices are but temporary, and that to give up the battle now only means to recommence hostilities a month hence. The local organs of Schuylkill county, as well as ourselves, have argued with and should have convinced the miners that this time he is in the wrong and should submit. Greater powers than they have given way to the general reduction in values, but alas! all logic seems but Greek to them.

There are a few collieries idle in the Lehigh District; the Old Company's men are yet out, and none of their coal is being received here.

The Pottsville *Journal* 9th inst., thus reviews the situation in its district:

"The suspension is general throughout the Schuylkill and Shamokin regions, except six in Schuylkill region and four or five in the Shamokin region, are among the smaller concerns. Of the six running in Schuylkill county two will stop to-day. One is worked because the mine is on fire, and the proprietor is compelled to work so as to protect himself from the fire. The other three ship from fifteen to twenty cars a day and do not belong to the Coal Association. The coal operators are determined to suspend for the whole month if the men will not come to terms, and in the present state of the country the other regions will be able to supply all the coal required in the meantime."

The Shamokin *Herald* says: "As we predicted last week, another suspension has taken place in our region. All the collieries in the county, as far as we can learn, worked on the principles of the W. B. A., are idle, except one at Trevorton. The Cameron, Burnside, Luke Fidler, Frank Gowen, Ben. Franklin, and one or two smaller collieries, are running, but they are worked by miners who either never belonged or who have 'cut loose' from the 'Union.' It is hard to foretell how long this suspension will continue. Some are under the impression that many of the miners, seeing that the present basis cannot be retained or a general one established, will resume work upon their own account when fair and favorable terms are offered."

PRICES.—Some of our quotations have been altered this week; about 25 cents per ton is obtained above the circular quotations, by the various companies.

FREIGHTS.—Vessels are in good supply.

RETAIL.—The warm weather is having a visible effect upon trade; the various company coals are selling at from $5.50 to $6.50, delivered. Lehigh, $7.50 to $8.

BITUMINOUS.

As the Cumberland coals are becoming more generally known among manufacturers, we note an increased effort by dealers to introduce them. Many of our leading yards now advertise them and consider it necessary to keep up stock in them. We quote Maryland Coal Company's George's Creek Coal at the low price of $7.

GAS COALS.

American Gas Coals are in fair demand; and we quote a good business doing in Despard and West Fairmount at $7.50.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending April 9, 1870, compared with week ending April 10, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	89,139	863,744	25,181	771,657
Schuylkill Canal	26,521	56,228	6,920	14,766
Lehigh Valley R. R., N			5,938	81,039
" " " S	62,669	763,779	67,226	882,467
Lehigh and Sus. R. R.	13,348	240,330	24,483	288,427
Lehigh Canal			8,640	8,640
Scranton North	9,904	138,570	10,978	166,462
" South	28,473	413,262	36,055	445,098
Penn. Coal Co., rail	20,319	196,386	22,762	251,001
" " canal			8,640	8,640
Del. and Hud. C., rail, N.			12,217	158,076
" " " south			8,569	68,243
Shamokin	8,146	87,877	4,805	72,539
Trevorton	373	5,408	2,503	67,780
Lykens Valley Coal Co.	1,250	12,175		
Wyoming South				
" North			5,944	81,493
P. N. Y. C. & R. R. Co.	4,954	36,969	6,268	62,917
Williamstown, Col'y.	2,694	15,904		
Short Mountain				
Total	267,789	2,846,632	247,529	3,420,555
1870	247,529		Incr'se	373,923
Decrease week and year	20,260			

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending April 7, 1870, compared with week ending April 10, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.				
C. & O. Canal				
H. & B. T. R. R.	5,234	79,884	7,285	66,016
Harrisburg & D.			11,956	137,563
L. V. R. R.				4,292
P. & N.Y. C. & R. Co.			3,290	55,907

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending April 7, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	25,191 04
Previously this year	746,565 19
Total	771,657 03
Same time last year	863,744 00
Decrease	92,086 17
Amount sent same week 1869	89,139 00

Report of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, April 7, 1870:

From St. Clair	387 19
" Port Carbon	2,354 07
" Pottsville	749 14
" Schuylkill Haven	14,515 19
" Auburn	1,543 15
" Port Clinton	5,495 07
" Allentown and Alburtis	104 03
" Harrisburgh and Dauphin	11,956 16
Total paying freight	37,148 00
Coal for Company's use	1,207 16
Total for week	38,355 16
To same time last year	913,895 07
Total	952,251 03
To same time last year	951,470 00

Report of coal transported over the Schuylkill Canal for the week ending Thursday, April 7, 1870.

	Tons. Cwt.
From Port Carbon	1,038 00
" Pottsville	176 00
" Schuylkill Haven	5,336 00
" Port Clinton	370 00
Total for week	6,920 00
Previously this year	7,866 13
Total	14,786 13
To same time last year	66,228 05

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending April 7, 1870:

	Tons.
For week	11,956 16
Previously this year	124,606 13
Total	137,563 09

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, April 9, 1870.

	WEEK.	SEASON.
North	45,141 16	584,910 08
South	8,599 10	68,242 12
Total	53,741 06	653,153 00
Corresponding time in 1869.		
North	42,537 00	497 829 00
South	1,736 03	22,883 04
Total	44,273 03	520,712 13
Increase North	2 604 16	Increase 87,080 19
Increase South	6,863 07	Increase 45 359 08
Total Increase	9,468 03	Increase 132,410 07

Report of Coal Transported over Lehigh and Susquehanna Railroad.

Week ending April 9, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR, 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	2206 18	16646 01	219539 19	149571 06
Upper Lehigh Region	3836 10	3414 10	18722 02	43324 06
Hazleton Region	2308 07	7034 00	4554 16	11354 05
Beaver Meadow Region	1476 18	3654 17	1-55 05	5191 15
Mauch Chunk Region		10296 05	30089 18	65901 09
Totals	30228 13	41045 18	274762 00	275346 01
Increase				10
Decrease	10817 05		2523 03	
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	18076 17	12324 00	227061 01	216529 16
Forwarded East of Mch Chunk by Canal	5805 13	26697 19	6354 04	35016 01
Delivered at and above Mauch Chunk	1032 05	1519 02	9546 13	10515 17
Delivered to L. & B. R. R. at Plymouth Bridge	5313 18	399 04	31800 02	4254 18
		105 13		5029 09
L. V. R. R. at Sugar N.				
Totals	30228 13	41045 18	274762 00	275346 01
Of the above there was from Mines controlled by Co., W.B.C. & I.Co	8372 05	8361 05	82308 06	73601 04
L. C. & N. Co	1344 03	10296 05	42845 00	65901 09
	9716 08	18657 10	125153 06	139402 03
Increase				
Decrease	8941 02		14219 07	

Report of Coal Transported over Lehigh Valley Railroad

For the week ending April 9, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVL'Y. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	12,519 19	188,047 13	200,567 12
" Hazleton	44,068 06	467,503 13	511,571 19
" Upper Lehigh	1,058 12	1,651 00	2,709 12
" Beaver Meadow	13,338 09	154,896 08	168,234 17
" Mahanoy	2,189 18	87,745 19	89,935 17
" Mauch Chunk		447 17	447 17
Total Anthracite	73,165 04	900,312 10	973,477 14
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		4,292 00	4,292 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	73,165 04	904,604 10	977,769 14
Same time last year	62,669 02	767,110 03	769,779 05
Increase	10,496 02	197,494 07	207,990 09
Decrease			
Forwarded East from M'h Chunk by rail	62,190 08	796,900 11	859,090 19
Same time last year	51,426 00	666,691 10	718,117 10
Increase	11,764 08	130,209 01	141,973 09
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	62,190 08	796,900 11	859,090 19
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	5,938 16	75,071 02	81,009 18
To L. & S. R. R. at Packerton for rail	167 16	2,753 00	2,920 16
Delivered at M'h Chunk	27 07	440 01	467 08
Delivered on line of road			
Canal, Mauch Chunk	208 17	5,430 04	5,639 01
Delivered above M. Chunk for use of L. V. R. R.	846 15	18,028 00	18,874 15
To L. & S. R. R., at P'n Hav., for railroad			
Do. for canal	2,308 07		2,308 07
At M.Chunk for canal	1,476 18	1,514 12	2,991 10
Total Anthracite	73,165 04	900,312 10	973,477 14
Bituminous Coal		4,292 00	4,292 00
Total all kinds	73,165 04	904,604 10	977,769 14

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending April 9, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,943 16	75,543 07	81,493 07
Bituminous	3,290 00	52,617 00	55,907 00
Total, Ant. and Bit.	9,233 16	128,166 07	137,400 03

Freights.—APRIL, 1870.

TO EASTERN PORTS.	From Philada's.	From E. Port and Port Johnson.	From Newburg.	From Rondout.
Amesbury	$3 25	—	$	$
Bangor	3 00	—	1 90	
Bath	2 75	2 00	2 10	
Boston	2 75	1 80	2 00	
Bridgeport	1 75	1 00	1 20	
Bristol	2 00	1 40	1 45	
Cambridgeport	3 00	2 00	2 15	
Derby	2 00	—		
Dighton	—	—	1 50	
East Cambridge	3 00	2 00		
Fall River	2 00	1 40	1 45	
Hackensack	1 95	1 50		
Hartford	2 75	1 50		
Jersey City	1 75	50		
Middletown	—	1 25		
Mystic	2 00	1 40	1 35	
New Bedford	2 25	1 50		
Newburyport	3 10	2 00	2 10	
New Haven	1 80	1 00	1 20	
New London	2 50	1 40	1 35	
Newport	2 00	1 40	1 45	
New York	1 25	50	70	
Norwalk	1 75	1 00	1 15	
Norwich	1 90	1 40	1 40	
Pawtucket	2 00	1 50	1 65	
Portland	2 50	1 80		
Portsmouth, N. H.	3 35	2 15	2 05	
Providence	2 00	1 40	1 50	
Rockport	—	—		
Saco	3 00	2 10		
Sag Harbor	2 00	1 40	1 35	
Salem	3 00	2 00	2 15	
Stamford	2 00	1 00	1 10	
Stonington	2 00	1 40	1 30	
Taunton	3 10	2 00		
Warren	—	1 40	1 50	
Washington	1 25			
TO RIVER PORTS.				
Albany		1 00	- 60	
Catskill		—	- 50	
Cocksackie		—	- 50	
Coeyman's		—	- 75	
Cold Spring		—	- 35	
Fishkill		—	- 30	
Haverstraw		50	- 60	
Hudson		—	- 50	
New York		—	- 70	
Nyack		50	- 60	
Poughkeepsie		—	- 35	
Rhinebeck		—	- 30	
Rondout		—	—	
Saugerties		—	- 40	
Sing Sing		—	- 60	
Stuyvesant		—	- 55	
Tarrytown		80	- 75	
Troy		1 00	- 75	
West Point		—	- 35	
Yonkers		40	- 60	

Foreign and Provincial Freights.

April, 1870.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons.....£13 10@£14 10
Liverpool.....12s.6d@14.ton

TO NEW YORK.

Provincial

Sidney.....$—
Lingan.....—
Cow Bay.....—
Port Caledonia.....—
Little Glace Bay.....—

TO BOSTON.

Sydney.....$—
Lingan.....—
Cow Bay.....—
Port Caledonia.....—
Little Glace Bay.....—

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven.....$2 00

From Port Carbon, 8 cents per ton more.

Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 12
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 28

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R. / Cam. & Am. R. R.	1 09
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 49

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven.....$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " / Freight / Towing	1 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 00
	2 40
For re-shipment	2 20
Total	$

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1.25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1.05
Total	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	55 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.	Per Ton.
To Manhattanville	8 cents.
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	12 "
Dobbs' Ferry	12 "
Nyack	14 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	23 "
Boats of 100 Tons	Per Boat.
To Manhattanville, and Return	$11 00
Spuyten Duyvil	13 00
Yonkers	15 00
Sing Sing	20 00
Peekskill	25 00

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

	AT NEW YORK, April 13.		AT PHILADELPHIA, April 14.	
SCHUYLKILL.	R. A.	W. A.	R. A.	W. A.
Lump	$—	$5 00	4 50	4 75
Steamer	—	5 25	—	—
Broken	—	—	—	4 50 to —
Egg	5 75 to 6 25	5 50	—	4 50 to —
Stove	— to —	6 00	—	4 50 to —
Chestnut	4 50 to 5 40	5 00	—	4 00 to —
Pea	—	—	—	—
LEHIGH.				
Lump, (along side)	6 00	—	—	—
Broken	6 00	—	—	—
Egg	6 00	—	—	—
Stove	6 25	—	—	—
Chestnut	5 50	—	—	—
Pea	—	—	—	—
SPECIAL COALS.*				
Diamond Vein	R. A.	—	—	—
New England	"	—	—	—
Locust Dale	W. A.	—	—	—
Honey Brook, Le'h	W. A.	4 75 to 5 75	—	—
Spring Mountain	"	4 75 to 5 75	—	—
Sugar Creek	"	4 75 to 5 75	—	—
Sugar Loaf	"	4 75 to 5 75	—	—
Old Comp'y's	"	4 75 to 5 75	—	—
Cross Creek	"	4 75 to 5 75	—	—
Enterprise	"	"	—	—
Girardville	"	"	—	—
McMichael	"	"	—	—
Shamokin	"	"	5 50	4 50
Lykens Valley	"	"	—	—
Broad Top	"	"	5 50	4 50
Hill & Harris	"	"	—	4 50
Henry Clay	"	"	—	4 50
Powelton	"	"	5 50	4 50

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Lg.	Sto.	Cst.
Lehigh	$3 50	$3 50	$3 50	$3 50	$4 00	$3 25
Wilkesbarre	3 50	3 50	3 50	3 50	4 00	3 25

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f.o.b. at Phila. $5 00
Lehigh " " 4 75
Cumberland Vein Coal 5 00
Cumberland C. & I. Co.'s on board N. Y. 7 00
Maryland Coal Co. " " 7 00
Consolidated Coal Co.'s " " 7 00

*Dealers in these coals may be found in our advertising columns.

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 50	4 50	4 75	5 00	5 75	4 60
Pittston at Newburgh	4 50	4 50	4 55	4 60	5 25	4 40
Lackawana at Weh'kn.	5 00	5 15	5 40	5 65	6 15	5 00
Wilk'b're at Hoboken.	4 75	4 75	4 75	5 25	5 75	4 75
Old Co. Lehigh at Pt. Johnston	—	—	—	—	—	—
Lehigh at E. Port	5 50	5 25	5 25	5 25	5 75	4 75

For freights to different points, see "Freights."

Prices of Foreign Coals.

April, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	14 50@15 50
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs., delivered.

Prices of Gas Coals.

April, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 43 Pine st., N. Y.

Duty, $1 25.	Coarse. Gold.	Slack. Gold.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75
Lingan	1 75	@— 75
Sydney	2 13½	@— 71½
Picton	2 13½	@1 18¾
Little Glace Bay	1 50	@1 00
Caledonia	1 50	@— 75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co.	$7 50	@— —
Penn.	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	— —	@8 00

AT PHILADELPHIA.

Powelton.....$7 50

Prices at Baltimore—April, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$6 00@6 75
Pittston and Plymouth	6 00@6 50
Shamokin Red or White Ash	6 00@6 25
Lykens Valley Red Ash	— —@6 50
Zerba Valley	6 00@6 25
Treverton, Red Ash	6 00@6 50
By retail, all kinds per ton of 2240 lbs.	7 25@8 50
Georges Creek & Cumberland f. o. b. at Locust Point for shipping	— —@5 00
West Fairmount Gas f. o. b.	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

April, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 75

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

METALS.

NEW YORK, April 13, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ₩ lb; Railroad, 70 cents ₩ 100 lbs.; Boiler and Plate, 1½ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₩ lb; Pig, 9 ₩ ton; Polished Sheet, 3 cents ₩ lb.

Pig, Scotch No. 1, ₩ ton	32 50@35 00
Pig, American, No. 1	33 00@34 —
Pig, American, No. 2	31 —@32 —
Pig, American, Forge	30 —@31 —
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	95 00@97 50

		Store Prices.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.		115 —@125 —
Bar, Refined	" "	77 50@ — —
Bar, Common	" "	72 50@ — —
Scroll	" "	87 50@115 —
Ovals and half-round	" "	85 —@110 —
Band	" "	95 — — —
Horse Shoe	" "	95 —@ — —
Rods, ⅜ to 3-16 inch	" "	85 —@12½ —
Hoop	" "	105 —@145 —
Nail rod, less 5 ₱ ct.		— 7 @—7½
Sheet, Russia, as to Nos. (gold)		— 11—@—12—
Sheet, Single, D, and T. Common		— 4½@— 6½
Sheet, Galv'd, Nos. 14 to 28 List 15, 16 and 17 c. 25@30 Fc. off		
Rails, English (gold), ₱ ton		59 00 @60 00
Rails, American, at Works in Pa.		74 00 @75 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb. and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 16	@— 20
English Spring (2d and 1st quality)	— 7	@— 10
English Blister (2d and 1st quality)	— 11	@— 18
English Machinery	— 11½	@— 14
English German (2d and 1st quality)	— 13	@— 15
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— —	@— 18
American, Spring, do.	— 9	@— 12
American Machinery, do.	— —	@— 12
American German, do.	— 10	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.	
Copper, New Sheathing, ₱ lb	—	@— 31
Copper Bolts	—	@— 31
Copper Braziers, 16oz. and over	—	@— 31
Copper Nails	36	@— —
Copper, Old Sheathing, &c., clean	17	@— 18
Copper, Chili Pig	—	@— —
Copper, American Ingot	19½	@— 19¼
Yellow Metal, New Sheating	24	@— —
Yellow Metal Bolts	24	@— —
Yellow Metal Nails	—	@— 24

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¾ cents ₱ lb.

Galena, ₱ 100 lbs	$—	@— —
Spanish (gold)	6 20	@6 25
German, do.	6 20	@6 37½
English, do.	6 20	@6 62½
Bar (net)	— —	@ 7 70
Pipe and Sheet (net)	— —	@ 7 70

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.	
Banca	33	@36½
Straits	33	@—
English	31½	@34

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 25 @8 50	$9 75 @10 00
I. C. Coke	7 00 @7 50	8 25 @ 9 00
Coke Terne	5 75 @6 00	6 75 @ 7 —
Charcoal Terne	7 50 @8 00	8 75 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb.

	Gold.	
Plates, Foreign ₱ 100 lbs.	$6 00	@6 12½
Plates, Domestic ₱ lb.	10	@— 11½

REMARKS.

IRON.—The demand for Scotch Pig continues moderately active, and as the supply is light, prices are supported; 300 tons Eglinton sold at $32@ $33, ex ship; and 200 do. Gartsherrie, $34 50 @ $35, from yard. There has been a little more inquiry for American, and we notice sales of 100 tons No. 1 Lehigh at $33; 1,000 do. No. 1, brand not named, and 400 do. Gray Forge and Mottled, at the furnace, on private terms. There has been an active demand for Wrought Scrap, and large parcels are rumored sold for shipment to Eastern ports, at a private price. New Rails are quiet but steady at our quotations; old Double-headed are scarce and in demand at $39, gold. Bar continues steady at previous quotations, with a little more demand.

LEAD.—There has been more business in Pig, but in prices there is no improvement; the sales are 100 tons ordinary Spanish and German at $6 25; 100 do., ex ship, $6 20, both gold, and 50 tons Spanish, ex ship, at a private price. Bar, Pipe and Sheet are steady at $7 70 per 100 lb., net cash.

COPPER.—New Sheathing is steady at 31 cents, and Yellow Metal 24 cents, cash. The mquiry for Ingot is very limited, and the market is without improvement. Sales have been made of about 100,000 lb. at 19⅜ @ 19½ cents for Lake Superior, and 19 cents for Baltimore. It is understood that several parcels of Lake have been contracted for for export, in all about 500,000 lb., for June and July delivery, but the price has not transpired.

TIN.—The demand for Pig is confined to small jobbing lots, but the advanced prices are sustained. Banca is very scarce, and small parcels can be bought upon more favorable terms than considerable lots; 50 slabs sold at 35½ cents, and some at 36½ cents, which is now the price; Straits is steady at 33 cents, at which figure 50 slabs sold; English nominally 32 cents, all gold. Plates are quiet and prices are unchanged; 350 bxs. I. C. Coke Tin, 14 by 20, sold at $7 12½, gold, and 1,000 do. Charcoal Terne were taken at a private price.

SPELTER.—Foreign remains in the same stagnant position, and prices are quite nominal.

ZINC.—American Ox. Zinc, 6½ @ 7c.; French do., 10 @ 10½c.; Sheet Zinc, 9 @ 10c.

MANGANESE—Ox. Manganese, 4 @ 4½c. per lb.

Mining Stocks.

NEW YORK, April 13, 1870.

We have no very material change to note in Mining stocks; large sales of Grass Valley are reported this A. M. at 23c.—the same as quoted in our last report. Some sales of Gregory are recorded at $1 65 @ $1 60; Central Gold at 23c.

In Petroleum stocks, sales of Buchanan Farm were made at 43c., and Central Petroleum at 58c.; Home is quoted at $3 55 to $4. The following is the latest report of the Stock Board:

	Bid.	Asked.
Bennehoff	—	—
Bergen Coal and Oil	35	50
Bliven Oil	30	1 00
Brevoort	1 05	1 25
Buchanan Farm	43	45
Central	56	58
Home Petroleum	3 55	4 00
National	—	—
N. Y and Alleghany	—	—
Northern Light	—	—
Pithole Creek	1 25	1 75
Rathbone	—	—
Rynd Farm	31	34
Second National	—	—
Tarr Farm	—	—
United Petroleum Farms	22	26
United States	72	78

San Francisco Stock Market.

The reports from the San Francisco Stock Market do not indicate a very material change from our last quotations. It seems a little singular that we do not hear from the market oftener than once a week. It is very difficult to form a correct opinion of the condition of the mining stocks unless we can have a constant record of the Stock Market transactions. It is possible that the recent mining excitement has so engrossed the attention of the members of the Stock Board that they cannot find time to meet but once a week.

Below is the latest and only report received since our last:

SAN FRANCISCO, April 12, 1870.

(By Telegraph.)	1st Board.	2d Board.
Savage	55	55½
Crown Point	—	—
Yellow Jacket	49¾	50½
Kentucky	86	85
Chollar Potosi	—	30
Gould & Curry	2 05	2 25
Ophir	—	—
Alpha	—	—
Belcher	25	24½
Imperial	48	—
Hale & Norcross	—	—
Amador	—	—

The New Thames Tunnel.

A NEW tunnel under the Thames has just been finished successfully in London, at a cost of £160,000; and a third is contemplated. Mr. BARLOW, the engineer, seems to have had less trouble in this work than his great predecessor, BRUNEL. The London *News* says of this tunnel, which is called the subway:

"The mysterious-looking thoroughfare admits of a very brief description. It is a well-structed tubular iron bridge, about a quarter of a mile long and seven feet in diameter, sunk bodily into the bed of the Thames, so as to be snugly embedded in the London clay through its entire distance. Nowhere is the subway nearer than twenty-two feet to the water, and in places it is as much as fifty feet distant—an important fact to bear in mind in comparing the subway with the old Thames tunnel, over the archcrown of which there were here and there but four feet to the water. The subway, in point of fact, dips at the rate of one in thirty. At present the Tower Hill station at the one end and the Tooley street station at the other, are more useful than ornamental, especially when the cage by which passengers are taken down is at the bottom. We use the word 'cage' because of its resemblance to that familiar object of the mining districts, but it is in reality rather a nicely padded little apartment, semi-circular in shape, and with cushioned seat for four or six.

"Into this the passenger enters and the doors are shut. There is a rumble, a rattle, a consciousness of steady downward motion, and an intention, perhaps, to remark to your neighbor that it is all very pleasant, but any such reflection is nipped in the bud by the termination of the journey, which has occupied about the time it would take to count a dozen. The distance is only fifty feet. Through a small waiting-room you enter a long, low carriage, with seats for seven each side. The signal is given, the drum begins to revolve, the wire rope twines swiftly round it, the pretty omnibus answers to the strain, and in about sixty seconds the subterranean passage of the Thames has been accomplished. Safety is secured in the shafts by an unusually powerful clip; in the subway by the single line of tram-rails, upon which collusion is impossible. We walked through the narrow, dark road yesterday, absolutely dryshod, and without any inconvenience from defective ventilation. At times a listener in the centre of the subway can hear strange noises, said to be the reverberations of paddles beating the river overhead, and the sounds of hammering and thumping on board vessels. The Tower-hill fares at present are fixed at a penny and two-pence, but they will probably have to be reduced by one-half."

Mining Sales.

FOREIGN and home capitalists are once more turning their attention towards gold and silver mining property for the investment of their surplus funds. There is one feature in regard to the transactions that we have chronicled of late, that is worthy of attention, and that is, *the sales have been confined to property of known value*—property upon which sufficient developments have been made to base legitimate estimates of its future productiveness. We hail this feature with great satisfaction, as the precursor of a system of legitimate mining, and a bar to speculation and fraud.

In connection with mining sales, the Reese River (Nevada) *Reveille* says: "We hear of several heavy mining transactions in the Eastern States and Europe of late. The Aurora South and the Eberhart mines will doubtless pass into the hands of an English company at an early day; the Pogonip and Othello, Tom Paine and Pocahontas mines are reported sold in Chicago: and a friend writes us that he has disposed of some White Pine mining ground in London at a handsome figure. Eastern and European capitalists are just now investing equally heavy in the base metal belt.

Folding Propeller.

AN English inventor, Mr. W. R. LAKE, proposes to construct the screw propeller of any desired form or pitch, and in two or more vertical sections perpendicular to the axis of re-action. It is divided in three parts, one of these is keyed or otherwise fixed to the shaft—the others are made to work freely upon the shaft. When the propeller is to be used to propel the vessel, the several parts are secured together by any convenient means, and then form a complete screw propeller. When the screw is not required for the propulsion of the vessel, as, for instance, when sails are used, the sections are disengaged and secured together in a line with each other, presenting a minimum surface of resistance to the passage of the water aft.

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st.	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col.	P. P. Fullerton, 71 B'way.	600,000	10 00		
Atlantic and Pacific	Humboldt Co., Nevada.					
Bates and Baxter	Colorado					
Benton	Colorado	W. F. Drake, 15 Broad.	500,000	5 00		
Briggs	Colorado	J. P. Davies, 19 Cliff.	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad.	2,500,000	100 00	25	50
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau.	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado					
Central Gold					23	25
Consolidated Gregory	Colorado				1 6	2 65
Combination Silver	Nevada			100 00		1 50
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way.	5 000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000 00			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way.	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col.	J. P. Davies, 19 Cliff.	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way.	1,000,000			
Edgehill		A. Fullerton, 71 B'way.	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 63 William.	400,000			
Fisk Gold		H. Johnson, 195 Fulton.	500,000			
Forest Queen		E. B. Beet, 62 B'way.	1,000,000			
Golconda Gold	Sherbrooke, C. E.	H. Adams, 71 Broadway.	2,000,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way.	1,000,000	50 00		50
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way.	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall.	400,000			
Grass Valley					24	
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000			
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way.	200,000	100 00		
La Crosse Gold	Nevada Dist., Col.	P. P. Fullerton, 71 B'way.	1,000,000		10	
Lander Hill T. & S.	Nevada	M.L.Catherwood,74 B'way.	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold						
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall.	12,000,000		6	6¼
Mariposa preferred	California	do. do.			13	13½
Montana Gold		G. De Cordova	400,000		3	
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William.	250,000			
Montrose	Clear Creek Co., Cal.	W. W. Perkins, 71 B'way.	1,000,000			
New York Silver	Nevada	Thos. Sprouil, 78 B'way.	1,500,000			
New York and Austin	Nevada	E. R. Sicconb, 70 Wall.	500,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall.	2,000,000			
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau.	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way.	2,000,000			
N. Y. & Utah P. & M.		W. H. Mailler, 108 Wall.				
Nye						
Ophir Gold	Comstock Lode, Nev.	L. C. Warner, 70 B'way.	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place.	1,500,000			
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		41	45
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way.	500,000	10 00	4	5
Rollins Gold		Thos. Bond, 132 B'way.	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad.	1,000,000		1 00	
Silver Bend		F. W. Macy, 20 Nassau.	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way.	1,000,000			
Silver Peak & R. M.	Nevada	W. B. Ogden, 52 Wall.	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad.	2,500,000	20 00	1 37	1 45
Social & Steptoe Con.		T. H. O'Connor, 24 Nassau.	450,000			
Standard Gold		C. B. Bostwick, 169 B'way.	500,000			
Symonds Forks					35	75
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau.	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way.	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way.	300,000			
Wauba Yuma	Arizona	J. W. Silsby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co.		M. A. Myers, 119 B'way.	$1,500,000	$25 00		
Ashburton Coal Co.		J. T. Rollins, 41 Pine.	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine.	1,000,000			
Brewster Iron		H. Robison, 165 B'way.	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co.		J. A. Simpson, 40 B'way.	2,500,000			
Carbon Hill Coal Co.		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way.	2,000,000	100 00		
Clifton Iron Co.		P. H. Riordan, 34 Pine.	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar.	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way.	5,000,000			
Crawford Coal		E. Clapp, Prest. 137 B'way.	1,000,000			
Cumberland C. & I. Co.		E. Kissam, 99 B'way	5,000,000		30¼	32
Derby Coal Co.		W. S. Davison, 71 Broad.				
Dover Coal and Iron Co.		R. Chase, 88 Wall.				
Del. & Hudson Canal Co.		R. H. Nerderpol, 7 Nassau.	15,000,000	100 00	100	
Ebervale Coal		G.L. Stout, Treas. 111 B'y.	500,000			
Fall River Bituminous		D. T. Brauvelt, 43 Pine.	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co.		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way.	500,000			
Iron Cliffs Co.		C. J. Canda, 52 Wall.	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way.	500,000			
Kemble Coal & I. Co.		R. A. Wight, 26 Ex. Place.	300,000			
Keokuk Coal		J. F. Franklin, 112 B'way.	100,000			
Lackawanna I. & C.	Pennsylvania	E. C. Lynde, 52 Wall.	1,200,000			
Lewis Run C. & I. Co		T. A. Sanborn, 80 B'way.	750,000			
Lykens Val. Coal Co.		F. A. Platt, 13 William.	800,000			
McKean Co. Bit. Coal Co.		J. H. Rolston, 80 B'way.	1,500,000			
Lehigh & Susquehanna		E. W. Cark, Philadelphia, Pa.			1 00	
Mahanoy			400,000	100 00		
McNeal C. & I. Co.		C. C. Godwin, 71 B'way.	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar.	300,000			
New Boston Coal		C. H. Ogden, 55 B'way.	2,000,000			
N. Y. Con. C. & I. Co.		A. T. Levine, 16 Wall.				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way.	150,000			
Pacific Coal Co.		G. Wrighton, 34 Wall.				
Peekskill Iron Co.		W. Murdock, 7 Nassau.				
Pennsylvania Coal Co.		E. H. Mead, 111 B'way.	3,200,000	50 00		
Richmond Iron Co.		J. Smith, 165 B'way.	1,000,000			
Scotia Coal Co.		[illegible] Soper, 42 B'way.	2,560,000			
Spring Mt. Coal		[illegible] Runyon, 111 B'way.	1,250,000			
Springfield & D'p Run C.		E. D. Webb, 77 Cedar.	600,000			
Stout Coal Co.		G. S. Comstock, 111 B'way.	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way.	1,000,000			
Tannerdale Coal		I. I. Ludlaw, 71 B'way.	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way.	420,000			
West Point Iron Co.		R. C. Brock, 116 B'way.	500,000			
Wilkesbarre C. & I. Co.		W. H. Tillinghast, 80 B'y.	3,400,000			
Wyoming Val. Coal Co.		E. Potter, 40 B'way.	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED
Anita Copper	California	J. A. Ferguson, 8 Wall.				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way.	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan.	W. H. Smith, 43 Ex. Place.	500,000	25 00		
Evergreen Bluff Copper	Michigan.	F. W. Caper, 44 Ex. Place.	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau.	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine.	500,000			
Guymard Lead		Samuel Vernor, 38 Pine.				
Hilton Copper		W. H. Smith, 43 Ex. Place.	500,000			
Hope Copper		J. W. Davis, 19 Nassau.	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William.	1,500,000			
Indiana Copper Co.		J. M. Mills, 25 Nassau.	500,000			
Isle Royale Copper	Michigan.	F. W. Caper, 44 Ex. Place.	1,000,000			
Keweenaw Copper	Michigan.	F. W. Caper, 44 Ex. Place.	500,000			
Lake Superi'r Silver Lead	Michigan.	A. S. Kellogg, 22 Pine.	1,000,000			
Omiga Copper	Michigan.	S. Cooper, 7 Pine.	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P.	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan.	J. W. Jones, 6 Broad st.	1,000,000			
St. Marguret Copper		E. P. Sutton, 43 Pine.	250,000			
Schoolcraft Copper		R. Walsh, 22 William.	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way.	500,000			
Union Copper		A. S. Kellogg, 22 Pine.	500,000			
Vermont Copper	Vermont	J. C. Ely, 191 B'way.	500,000		5	10
Wallkill Lead, asst		S. M. Pond, 70 B'way.				

MISCELLANEOUS.	SITUATION MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co.		W. E. Lawton, 19 Cliff.	$1,500,000			
Bigelow Blue Stone Co.		H. Bogardus, 14 Pine.				
Quicksilver					10¼	10½
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl.	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co.	New Jersey	A. H. Farlin, 61 Maiden L'e.	1,500,000			

Polytechnic Club of the American Institute.

Meeting held at the Rooms of the Association, April 14, 1870, Professor S. D. TILLMAN in the Chair.

THE first subject for the evening was "Malaria," upon which Professor DARBY presented a paper. Of the real nature of what is termed "malaria," very little has really been known heretofore. The vague information upon the subject is illustrated by the name itself, which simply means bad air. Some of the ideas formerly entertained were then discussed. Before mentioning the points in dispute at the present time in regard to the subject, the speaker said an incident of his own experience would illustrate the subject and put it clearly before the audience. He was gathering specimens in a swamp near Macon, Georgia, and came to a place where they had been building boats. The chips and rubbish were lying about, decaying, and as he sat down upon a stick of timber, he felt a sudden sensation, a shock to the system, and as a result of it had a bilious fever. This sudden impression was a point of great interest, as it might throw light upon the subject of malaria in future investigations. Chemists had hunted for infusoria in the air of the most malarious places. The condensed air from the pontine marshes yields a substance which, on account of its quick putrefaction, was called puterine. This, it was supposed, might be the element in the air which would impart to it the malaria, or make it bad air.

The next point was the methods of testing air for the presence of malaria; a subject upon which much attention had been bestowed for many years. The instability of permanganic acid in the presence of foreign bodies, led attention to it as a means for the detection of malaria or puterine in the air, and after giving a slight history of former attempts in this direction, Professor DARBY illustrated his own method, which is to draw a given quantity of air through a solution of the acid having a known strength, and thus not only testing for the presence, but actual amount of puterine in the air at the time. The arrangement for this object was very simple; it consisted only of a water receiver, into which the air was drawn by the escape of the water, the entering air passing on its way through a series of potash bulbs containing the acid, which was at once decomposed in the presence of malaria. This brings us to the question: "What is malaria?" One theory calls it a vegetable germ, while the other says it acts in a chemical way. LIEBIG inclines to the latter opinion. The speaker had no theory of his own, and was as ready to accept the one as the other as soon as either could be proved. It seems, however, to have a chemical rather than a vegetable source. The sudden effect of the malaria in the swamp could hardly have been produced by a vegetable germ; reasoning would say the action was too sudden, and that it was hardly possible for the germs to produce such a marked and sudden shock. Several cases, as the Black Hole in Calcutta, were then mentioned, showing the very rapid action of the cause, whatever it may be. A swamp where the malaria exists is known in a moment. It is surrounded by a barrier of vegetation; the long moss hangs from the trees, and there is a lack of humble vegetation; on the other hand, swamps that are free from malaria are open to the country; they abound in grass tussocks; juniperus is found, and many other plants, which never occur in the other. These swamps are without malaria, yet, as a rule, their waters contained the most infusoria, and the slime beneath the leaves of the water plants was the thickest.

Of the properties of malaria, we know that it is heavier than air; it is always found low down, always lower than the fourth floor. There is little danger of it in the day time. These points were illustrated by the fact that soldiers at Antigua, who had night service to do in a low battery, always died of the fever, while those who served either day or night above, escaped. So in the Pontine marshes, the laborers know that they are free when standing, but are sure to be struck if they lie down or stoop so as to bring the face within a few feet of the earth. Every soil will produce malaria, provided there are no vegetable growths about to absorb it, even the driest, cleanest places. As an instance, Crooked Island, Florida, was given a dry bank of sand, and yet a most deadly situation; around its edges the amaranthus, which on the main land reached barely the size of the finger, was as large as the wrist, and very tall. The reason for its unhealthfulness and the rank vegetation, was found in a rich mould down below the sand. That which makes the malaria makes the plants grow. When the English army, crossing mountains in Spain, encamped in dry river beds, the soldiers had the fevers, for the banks were still moist and filled with the malaria.

Now there were some exceptional cases, where typhoid fevers broke out and raged where the air must be very pure, as, for instance, in Williamstown, Mass., many years ago. The snow was deep and the cold intense; still the epidemic was fearful. What was the cause? The cellars were full of vegetables, perhaps decaying; the deep snow sealed up the cellars completely; there was no ventilation, and people were living all this time over them, and the malaria would rise up through the houses. Malaria is seldom found in running water; the air oxidizes it, and vegetables destroy it. In proof of this point, the speaker said that he had an apple tree, the limbs of which were loaded down with fruit, and under its branches the fallen apples were decaying. Testing for malaria below the limbs, he found it in abundance, but failed to find a trace just outside the leaves and above them. He thought that vegetables absorbed it as they do carbonic acid. A belt of trees is a protection against it. A belt of sun-flowers is often planted around a place to confine the malaria, and this is always successful.

If you have been exposed in the swamp, go out—get upon the highland, take long, deep inspirations, and burn up the malaria in the system. Ozone is one of the most remarkable substances that nature produces. It is the only perfect disinfectant, and it is certain that where there is ozone there is no malaria, and where there is no malaria there is no ozone. By means of the permanganic acid and potash balls, we can get the exact or the relative amount of the ozone or malaria in a given amount of air.

The permanganate of potash will destroy all sorts of *matières morbifiques*, and eat up all sorts of dead matter, and it does this before attacking any living matter present. It is thus an admirable test for the purity of water, showing at first the amount of dead matter in the water, and thus attacking and destroying the living. The theoretical action of the permanganate of potash, and the effect of chlorine in the solution, in making it more stable and at the same time more powerful, were dwelt upon at length.

The action of carbolic acid, arsenic, etc., as disinfectants, were considered, and the fact developed that, properly speaking, they are only arresters of decay, and not disinfectants.

In the swamps of Florida, by the use of the permanganate of potash upon the hands and face, he had been able to resist the effects of the malaria, even in the most deadly situations.

Dr. VAN DER WEYDE—As far as I have heard of this, it is sound doctrine. (Applause.) I was not present at the beginning of the meeting. The Doctor went on, and discussed the allotropic form of oxygen, alluding at the same time to a similar condition which certain other substances take. He concluded from the allotropic form of solids, the possibility of the same taking place in the gases, and making altogether a very clear statement of the various theories of ozone. In speaking of the purifying, Nature gives to water as it flows, by oxidizing foreign matter, the Professor alluded to the water of the Schuylkill at Philadelphia, which in the summer is very good and pure, in spite of the sewage of several towns above, but where, in the winter, access of air being prevented by ice, it becomes so bad as to be almost unfit for use.

Dr. BRADLEY thought that both germ and chemical theories had a great deal of truth in them. Did not think that ordinary fever and ague were caused by malaria, but by failure of the system to get rid of effete matters, on account of some change in the air, which prevented the insensible perspiration from passing off. Animals can be killed in a very short time by preventing perspiration by an impervious covering.

A motion was then made to extend a vote of thanks to Mr. DARBY for his paper, and to request him to put it into a popular form, which, after being seconded by nearly a dozen voices, was unanimously carried.

A neat little attachment for a sewing machine starter was then shown by Messrs. NEEDHAM and BRAINARD. It consisted of a little ratchet and wheel on the main shaft of the machine, which, when the machine is running, falls clear, and is perfectly noiseless, but whenever the machine stops, engages the wheel, and starts the machine *ahead* without any trouble of removing the hands from the work. It can be applied to any machine, and is perfectly effectual.

As the Club was about to adjourn, an amusing discussion took place between the doctors and the steam-engine men, the former thinking they had not had a fair chance.

Mr. ROOT took the ground that the human skin was only a *surface condenser* in another form, and argued that the doctors could learn something from the steam men. It was then suggested that the steam man be brought forward as a compromise between the two parties.

American Institute Miscellanv.

Items read at the meeting, held at the rooms of the Association, March 31, 1870.

OBSERVATORY ON MOUNT ARARAT.—The Paris *Cosmos* says that the Russian Government has resolved to establish an astronomical and meteorological observatory on this mountain, situated near Tiflis, in consequence of the excellent report given by Dr. PIAZZI SMITH of the fitness of such high situations, derived from his experience on the Peak of Teneriffe.

PLATINUM LIGHT.—M. SCHINZ states, in the *Cosmos*, that his experiments prove that platinum brought to a white heat by means of the ignition of a mixture of hydrogen and carbonic oxide gases yields a light which, in relation to the illuminating power of that of good coal gas, is as 1.24 to 1.

GASES IN ARABLE SOIL.—M. HERVE-MANGON, writing on this subject in the *Cosmos*, states that, akin to most porous substances, arable soil has the property of condensing gases. He found that the quantity of gases thus condensed varies in bulk (for the same quantity of soil) from 2 to 10 volumes of gas.

COLORS OF GASES IN GEISSLER TUBES CHANGED BY MAGNETISM.—M. Trève, in a late communication to the French Academy of Sciences, gives an account of his experiments with gases inclosed in glass tubes, and exposed to a current of electricity, and at the same time to the influence of a powerful electro-magnet. Having taken a Geissler tube filled with hydrogen, one portion of the tube being drawn out to capillary thinness, he caused the induction current to pass through it, which, as is well known, imparts to the gas in the thick part a blue color, tinged with violet, and in the capillary portion a brilliant red. Now, if the latter be placed between the poles of the electro-magnet, the red at once disappears, and is converted into white light. In the case of oxygen, the capillary part is milky white; under the influence of electro-magnetism it becomes red. Under the same circumstances the blue of nitrogen becomes much darker, and the sparkling white of carbonic acid turns blue. Hence, so far, magnetism is found to destroy or change the color of a gas in the capillary part of a tube containing it.

ANOTHER LARGE TELESCOPE.—Messrs. COOKE & SON, of York, England, have just completed a telescope thirty-two feet long, having an object-glass twenty-five inches in diameter. No report has reached us regarding its power and quality. It was made for Mr. NEWALL, submarine cable manufacturer, of Gateshead, who intends to erect an observatory for its accommodation at Madeira.

WATER-PROOF PACKING PAPER.—This paper is prepared by coating it with a resinous liquid, and afterward painting it with a solution of glue and soot, to prevent the appearance of blotches. After it is dry, the true water-proof coating is applied, which consists of a solution prepared with two and a half ounces of powdered shellac to two pints of water; to this, while hot, is added gradually one-third of an ounce of pulverized borax; at the same time mineral coloring matter, like ochre or umber, may be added. When cold it is ready for use. The operation of coating is so quickly performed that two persons may prepare three thousand square feet of paper per day.

THE CONTINUITY OF THE GASEOUS AND LIQUID STATES OF MATTER.—In a paper on this subject, read before the Royal Society of London, Dr. THOMAS ANDREWS gives an account of various experiments made by him, during a series of years, upon gases, especially describing the combined effects of heat and pressure upon carbonic acid gas at temperatures varying from 13° C. to 48° C., and at pressures ranging from 48 to 109 atmospheres. The temperature at which this gas ceases to liquefy by pressure he finds to be 30.92° C. or 88° F., and this he calls the critical point. Although liquefaction does not occur at temperatures a little above this point, a very great change of density is produced by slight alterations of pressure, and the flickering movements are conspicuous which render fainter the surface of demarkation between the liquid and gas. As the direct result of his experiments, he concludes that the gaseous and liquid states are only widely separated forms of the same condition of matter, and may be made to pass into one another by a series of gradation so gentle that the passage shall nowhere present any interruption or breach of continuity. From carbonic acid as a perfect gas to carbonic acid as a perfect liquid the transition may be accomplished by a continuous process, and the gas and liquid are only distant stages of a long series of continuous changes. Under certain conditions of temperature and pressure, carbonic acid finds itself, it is true, in a state of instability, and suddenly passes, without change of pressure or temperature, but with the evolution of heat, to the condition which, by the continuous process, can only be reached by a long and continuous route. The author discusses the question as to what is the condition or state of carbonic acid when it passes at temperatures above 31° C. from the ordinary gaseous state down to the volume of the liquid, without giving evidence during the process of the occurrence of liquefaction, and arrives at the conclusion that the answer to this question is to be found in the intimate relations which subsist between the gaseous and liquid states of matter. In the abrupt change which occurs when the gases are compressed to a certain volume at temperatures below the critical point, molecular forces are brought into play which produce a sudden change of volume; and during this process it is easy to distinguish, by optical characters, the carbonic acid which has collapsed from that which has not changed its volume. But when the same change is effected by the continuous process, the carbonic acid passes through conditions which lie between the ordinary gaseous and liquid states, and which we have no valid grounds for referring to the one rather than to the other. Nitrous oxide, hydrochloric acid, ammonia, sulphuric ether, sulphide of carbon, all exhibited critical points when exposed under pressure to the required temperatures. The author proposes for the present arbitrary distinction between vapors and gases, to confine the term vapor to gaseous bodies at temperatures below their critical points, and which therefore can be liquefied by pressure, so that gas and liquid may exist in the same vessel in the presence of one another.

The New York Elevated Railroad Trial Trip.

ON the 13th instant, several experimental trips were made over the Greenwich Street Elevated Railroad. A large number of persons were present, consisting of invited guests, members of the press, and gentlemen connected with the enterprise. The general scheme is to construct a track above the street, supported upon wrought-iron columns, which are firmly fixed in the ground, just at the outer edge of the sidewalk. The mode of propulsion is an endless wire rope, moved by engines beneath the sidewalk. Each rope is a mile in length, and of course reaches along the track for half that distance, returning over a large pulley half a mile from the engine-house.

This plan has been carried out, and there is at present a single track in working order, extending from Courtlandt street along Greenwich street and Ninth avenue to Twenty-ninth street—a distance of about two miles and a half. It is supported upon strong wrought-iron columns, about eighteen feet high, which are firmly anchored, so as to make a fine road bed. The wire which drives the car has attached to it at short intervals, of say two hundred feet, small iron trucks, which run between central rails. These trucks carry a projection, or "horne," as it is called, which catches upon an arm beneath the car, and so furnishes the motive power.

At four o'clock we stepped into the car, which is nearly twice as large as an ordinary street car, high, roomy, and pleasant. The doors are on the sides near the ends. Across the ends and along the sides, between the doors, are seats arranged, after the fashion of the ordinary street car. A few minutes past four, the signal was given—a slight shock as the arm catches the rope—another as we get up full headway, and away we went, the first passenger train over the new road. People on the sidewalks stopped in crowds to look, and from the windows of the houses the occupants gazed in silent wonder. As to the car, it went steadily on its way, until, with a pause, and then a slight jerk, it passed from one rope to the other, and in about fifteen and a half minutes by the watch we were at the depot on Twenty-ninth street.

This is about the quickest time, we think, that an equal number of persons ever made between the same points. After waiting a few moments, the word was given, and back we came. As far as the accommodation of through passengers is concerned, we think the road will be a decided success.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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Smoke.

MANY phenomena of atmospheric currents may be very easily studied in certain simple experiments with smoke; and, as this subject is intimately connected with ventilation in architecture and in mining, we propose to describe one or two experiments, which the curious reader may modify and combine in many ways, and from which he may deduce many interesting and important conclusions.

These experiments should be performed in a room free from strong drafts of air, and both the experimenter and the observer should abstain from sudden movements and from talking in the immediate neighborhood. To show the first experiment, a velvety surface is required; and a writing desk covered with velvet or baize is a capital apparatus. A pipe is freshly filled with tobacco, and lighted, and the experimenter, after a preliminary puff or two, takes a long pull, filling his mouth with as much smoke as he can conveniently retain. Then bringing his face close over the velvet or baize surface, say at the upper edge of the desk, he opens his mouth, and without breathing or blowing, allows the dense, white smoke to pour downwards, out of it. It spreads over the velvet, and pours down the sloping surface, as though it were milk, even spilling over the edges, and falling a considerable distance, before dissipating itself in the air. The too sudden removal of the experimenter's head will cause a current of air, and break up the smooth sheet, but portions will still remain, drifting over the cloth, and drawn into a gauzy, fibrous structure by the combing of the furzy surface to which they cling. The explanation of the phenomena is found in the fact that the first smoke of a pipe is cold, moist and heavy, and that the structure of the cloth-surface entangles and breaks up the currents of air which would otherwise get under the smoke, and lift and dissipate it. The later, light blue smoke of a pipe, or that of an ordinary dry segar, will not present this exceedingly beautiful appearance. By moistening the tobacco, however, the denser smoke may be reproduced at will.

But a perfectly smooth surface will show the same peculiarity, since it admits of a close contact with the smoke, excluding as effectually as the velvet or baize, the lifting and dissipating currents. To show this, a shallow dish, nearly filled with water, is sufficient. An oblong form is the most convenient. The smoke is discharged, as in the former experiment, without impulse, and spreads in a beautiful white sheet over the surface of the water. The advance of this sheet, with a clearly defined edge and thickness, from one end of the dish to the other, may be distinctly seen. The water keeping the stratum of smoke cool and moist, and probably also exerting upon it a capillary attraction, it will remain in this position, if not disturbed, for a considerable period; and frequently a second and third layer may with proper care be added, until the dish appears to be full of a cloudy liquid. Slight disturbances of the air in the neighborhood produce vertical motions and surges in the cloudy mass, illustrating clearly some of the phenomena of aerial currents. The effect of a heated column of air upon cooled layers in its vicinity is known to be one of the elements in the production of winds and storms. This may be beautifully illustrated by the simple expedient of placing on the surface of the water, near one end of the dish, a heated penny upon a cork-float. The ascending column of heated air remains, of course, invisible, until a sheet of smoke has been deposited upon the water from the other end of the dish. The smoke advances as before, quickly and quietly over the dish, but no sooner has it surrounded the cork-float than a sudden jet, shooting vertically upwards, for the distance, sometimes, of a foot or more, proclaims that the sensitive material which seemed, an instant before, so heavy and inert, has felt the impact of a new force. It is not the heating of the smoke by the hot penny, but the power of the rising air-current, which carries the cloudy column upwards. It only requires that opposing upper currents in the atmosphere above should be skilfully represented, to make this experiment a complete picture of the processes of winds and storms.

An important practical suggestion is contained in these simple manipulations. The sluggishness of heavy, cold, moist gases or vapors, and the manner in which they cling to cold, fibrous or smooth surfaces, are serious obstacles to successful ventilation, and the ease with which a small upward current, artificially produced, may be made to vivify, as it were, and draw upward with it a considerable body of such vapor, is a hint of some value in practice.

There is a further application of this subject, in which the limitation of the same principle is frequently illustrated (also by smoke) to the surprise and annoyance of housekeepers. We refer to the unaccountable behavior of gas-stoves, which sometimes begin to smoke abominably, while at the same time the gas leaks out into the room. If the housekeeper, under the vague impression that smoke indicates incomplete combustion, and hence an insufficient supply of air, enlarges the openings below the flame through which air is admitted, to be mixed with the gas before combustion, the result is an increased leakage of gas.

This difficulty occurs with stove-burners manufactured, for the sake of cheapness, of tin or sheet-iron cylinders, open at the bottom, and covered at the top with wire-gauze. The gas-jet is placed just within the cylinder at the bottom; and it is expected that the pressure upon the gas in the pipes will impart force to the ascending jet, by virtue of which it will draw upward the necessary amount of atmospheric air to produce the complete combustion and high heat indicated by the blue flame. This is the theory of the BUNSEN burner, upon which gas-stoves are modelled, and in which not merely the previous mixture of common air with hydrocarbon gas, but also the mechanical pressure and consequent rapidity of the current, plays an important part. But the manufacturers of the stoves frequently do not comprehend the principles involved, and hence disregard the necessity of maintaining a due proportion in the parts. The cylinder over the gas-jet is frequently too large in diameter; and the result is, that the pressure in the pipe being small, and the diameter of the wire-gauze, or surface of combustion, being very large in comparison with that of the gas-orifice, the gas fills the whole cylinder, smokes above, for want of air, and leaks out below, by reason of counter-currents produced in the interior. Making larger holes at the bottom of the cylinder will only increase the latter evil. The inert surrounding air will not rush in, because the cylinder is too large to effect a sufficient velocity of the gas-current. The remedy is to diminish the area of the cylinder-section, just over the gas-jet. This may be done by substituting a smaller cylinder altogether, or by introducing into the larger cylinder a small interior one, extending two or three inches above the gas-jet, and by closing the annular space between them, so as to prevent downward counter-currents. Within this smaller channel the gas will rush upwards with force, dragging the air with it.

An analogous difficulty is often explained with chimneys. In this case the motive power is not mechanical pressure, but heat; and if the chimney is too wide, and the fire small, this power is often insufficient to lift the mass of cold air and heavy smoke which fills the flue. The formation of counter-currents in a wide chimney, or the weight of air in the upper portion, sometimes causes the rising smoke to curl downward again, like the curving and falling waters of a fountain. In such cases, the introduction of a smaller flue inside the other, extending for a sufficient distance to give momentum to the ascending current, will remove the nuisance. We should think it possible, and perhaps it would be highly useful, to devise some adjustable arrangement of this kind, by which the proportions of the flue might be adapted to the conditions of fuel, fire and weather. Dampers do not cover the case.

The application of these suggestions to the ventilation of mines by the steam-jet is scarcely necessary. That subject has been carefully investigated; and probably those engineers who employ the steam-jet are fully acquainted with the principles governing its action.

West Virginia Oil and Coal.

WE hope it is not too late to call the attention of our subscribers to the announcement of Mr. R. P. ROTHWELL, of Wilkesbarre, Penn., who is probably by this time engaged in his proposed explorations and examinations in the coal and oil regions of West Virginia. Mr. ROTHWELL'S reputation as a careful and experienced engineer, especially in coal-mining, is deservedly high, and parties desiring trustworthy information from that section on that subject can scarcely do better than to avail themselves of this opportunity to secure his services. Letters addressed to Wilkesbarre will undoubtedly be forwarded to him.

West Virginia is destined to partake of the general revival of industry and prosperity in the South. The recent removal of the capital from Wheeling, in the "pan-handle," to Charleston, on the Kanawha, is significant of a determination on the part of the young State to build up her own success upon her own resources. The vast wealth of the Kanawha valley will make itself known when the new trunk line to the seaboard shall have been completed. Coal, salt, oil, lumber, tobacco, wool—these are staples of sufficient variety and importance to furnish a substantial foundation for a populous and thriving community.

The Inaction of Congress.

CONGRESS has now been in session over four months, and the subject of the relief to be afforded to our ship-building interest has received no definite action. The committee appointed at the last session have made their report, but, beyond this, nothing has been done upon this subject; so vital in its importance to the commerce of the country—so closely affecting even the power and life of the nation itself. The President, by a special message, has urged immediate action; Mr. NIMMS, in his statistical report, has vividly shown, by accurate tables, the fearful decline in our ship-building. Yet Congress has not acted. They have frittered away their time in useless talk, and still more useless investigating committees, while the important subjects before them have been suffered to lie idle upon the Speaker's desk, or have been quietly interred in the pigeon-holes of the committee room.

From every ship-yard from the Rio Grande to the Bay of Fundy—from every commercial port on our Atlantic or Pacific coast, comes up in imperious tones a demand that Congress shall act, and act at once.

At the North, spring and summer are of utmost importance in the construction of vessels. So much more work can then be done, from the greater warmth and longer light by which nature assists man in out-door labor, that every day of delay now becomes almost doubly disastrous.

Parties are ready to build, but dare not enter into contracts, until it is seen what course of legislation will be pursued. Should Congress intend to do nothing whatever, at least let the decision be announced. Any action is better than no action. There is neither right, nor justice, nor wisdom in the suspense, which is keeping thousands of workmen idle, and millions of capital awaiting the decree. It were better, even, if by a decisive vote—so decisive as to admit of no hope—it were declared impolitic for the Government to extend encouragement to this important branch of industry and national support. Then, workmen skilled in the handicraft of ship-building, engineers and architects educated to design, and capitalists accustomed to invest in ships, would know that to some other pursuit, or some other country, they must hereafter turn their hands and their means. For the world is wide; and our own country is so large, and labor and capital in it are so scarce, that there are always new pursuits open to both when from any cause former pursuit has ceased to demand them.

By all means let us not favor legislation in the shape of subsidies to special lines. This would tend more to hasten the decline of ship-building than any other measure. As we have before said, all we desire is that ship-builders in this country shall be placed upon the same general basis as are those of rival countries.

We would also caution Congress against the efforts of the English ship-builders and their agents now in this country, who wish to have ships now built admitted free of duty. It is said that there have been no less than sixty steamers built on the Clyde and Tyne, with a view to their sale in this country, and that a large amount of money has been raised to carry a bill through Congress permitting such vessels to be registered; that newspapers in this country, among others two of the most prominent dailies of this city, have been induced to support such a measure, and that parties are now lobbying in Congress to effect the same end.

Iron vessels will last from twenty to thirty years, and to that length of time will the injury of their registration be felt. With the permission to obtain materials cheaply, we can compete in price with English builders, and surpass them in models, securing greater ability to carry safely and economically, so that, eventually, we shall drive them from competing routes, or compel them to adopt our designs. But a heavy drag on our efforts would be the capital invested in these sixty vessels.

Manometer for Measuring the Pressure of Furnace Gases.

Translated from "Deutsche Industrie Zeitung."

To measure the pressure in the pressure-furnaces used for the manufacture of wrought-iron and steel, BESSEMER, who has lately experimented considerably in this direction, uses a simple manometer. It consists of a vessel containing quicksilver, which is fastened to the outside of the furnace wall, and connected with the inside of the furnace by an iron pipe of about one inch diameter and open at both ends. In the top of the vessel is inserted a glass pipe, to which a scale is affixed. The gases, entering through the iron pipe into the vessel, exert a certain pressure on the quicksilver and force it up into the glass tube. Hereby the pressure of the furnace-gases would of course be indicated, but the quicksilver would soon be heated and become gaseous. To prevent this, BESSEMER connects with the lower part of the iron pipe a narrow tube, which branches off from the wind-pipe and leads a feeble stream of cold air into the iron pipe, in which it ascends and hinders the contact of the hot gases with the quicksilver. This cold stream of air is too weak to influence perceptibly the indications of the manometer, while, at the same time, it affords to the quicksilver the necessary protection.

Diamonds in New Localities.

IT is interesting to know that a new locality for diamonds is reported by Herr GUSTAV ROSE, of Berlin, which may be considered the first in Europe, if the western slope of the Ural is placed out of the question. The stone referred to was found in the mines of Count SCHÖNBORN, in Bohemia, in alluvium, and has been unquestionably identified as a diamond, both by the combustion of a splinter into pure carbonic acid, and by its physical and mineralogical properties. Its weight is fifty-seven milligrammes; it is cubical in shape and of a light yellow color, and is probably not the only one to be discovered. Professor WÖHLER, of Göttingen, has also discovered minute diamonds in a piece of platinum from Oregon.

The St. Louis Bridge Caisson.

THE following description of the construction and the manner of sinking the caisson, for a pier to the St. Louis bridge, we take from the Philadelphia *Railroad Register*. The work is under the superintendence of Capt. JAS. B. EADS. The bed rock for the eastern pier was reached at a depth of 95 feet below the surface of the river, and was the occasion of great rejoicing, as mentioned in the press report about the 1st of March.

A pneumatic caisson consists of a platform of solid timber, like a raft, and in this particular instance of hexagonal shape, 80 feet long from point to point, and 60 feet wide from side to side, with a central hole 7 feet in diameter. This raft is anchored in the river where the pier is to stand. Stone courses, made of the smooth Missouri rock beds, and roughly fitted to each other, and fastened by hydraulic cement, are then laid upon the timber raft, which rests on the river mud, and sinks gradually. As it sinks, new stone courses are laid upon it. The holes in the raft are kept open in the stone work, making wells of the same diameter, so that the pier when finished has five wells or circular shafts in its body, one 7 feet wide in its centre, and four others each 4 feet wide. A winding staircase allows the workmen to ascend and descend the central well, and the others are used for the ascent of material abstracted from the river bed, mud, sand, gravel, etc., whatever is to be removed to give place to the descending pier.

This excavation is not accompanied by pick and shovel, nor is any ordinary hoisting apparatus employed. The whole work is ingeniously accomplished by a beautiful application of a kind of Giffard injector of a large size, which, instead of using steam as a motive power to drive the water into a steam boiler, uses water as a motive power to drive sand and mud from a depth up into the air. A tube is sent down one of the four feet wells to and through the timber raft, into a room under it, formed by timber walls, eight feet high, supporting the edges of the raft all round. This room, therefore, has walls and a ceiling, but no floor. Its floor is the river bottom to be excavated, and as the excavation proceeds, the walls, the ceiling, and all the masonry above, with the five included wells, and staircase, and tubes, and powerful water force-pump, descend together, as a solid whole.

Down through the tube the water is forced. The tube forks. One fork points downward, and ends in a branch-pipe, which is directed against the mud snd sand-bottom to liquify and stir it up, and keep it in motion. The other fork turns and enters the side of another tube, inside of which, and pointing upwards, it becomes a branch pipe also, or tuyere, like that which delivers the jet of steam into the Gifford injector. The ascending tube into the side of which the tuyere of the descending tube thus enters, is continued downwards, and its open mouth hangs (flexible and movable) over the lower branch pipe wherever it happens to be at work. The result is that a powerful upcurrent of water is all the time rushing along the ascending tube from its bottom to its top, sucking up the agitated mud and sand, and delivering it at the river surface into scows which carry it away. The upcurrent is powerful enough to carry small stones, as large as nuts. All the large fragments of rock which are met with are picked up by the workmen, and shovelled aside, and built into the cracks of the masonry, or got rid of up the staircase.

To keep the room under the caisson free of water which is always trying to force its way in, through the under walls, air has to be pumped into it, just as in a diving bell. It is in fact a wooden diving bell. The men work in this condensed air. At the present depth of eighty-nine feet the pressure of air is very severe, being fifty-seven pounds to the square inch instead of fifteen, which is the ordinary pressure of the atmosphere at the surface of the earth. Many persons are made sick by it, and the workmen are beginning to suffer from it.

The air-trap is a contrivance (like a lock in canal for allowing a boat to go from one level to another without letting the upper level water down in a body to the lower) to permit the workmen to pass from the open air of the staircase well into the compressed air of the caisson room. It is a porch or entry, with two small doors, one opening into the bottom of the well (carried down for convenience six feet below the timber ceiling of the room), and the other into the caisson-room. The doors simply swing against a listing of india rubber, and are held tight by the air pressure. The workmen at the bottom of the staircase opens a cock, and lets the compressed air of the trap (which is seven feet high and five feet wide and long) escape. The first door is then easily opened and shut again. A cock beside the second door is then turned, and the compressed air fills the trap (making the ears crack, and the head swim), and then the second door can be easily pushed open; whereas now the first door could not be opened by a force less than that of one hundred and thirty thousand pounds.

Inclined Plane Railroads.

THERE are several companies about to build railroads up the side of the steep hills about Pittsburgh, so that they may be made accessible and suitable for residences. The Pittsburgh *Chronicle* gives the following description of one of these roads:

"The road reaches from the base of Coal Hill, starting a short distance below the Birmingham suspension bridge, to the top of the hill in Mount Washington village. The incline is thirty-five degrees, equivalent to a grade of three thousand seven hundred feet per mile, or a rise of one foot in one foot and four-tenths. The length of the incline is six hundred and seventy feet, and the height is three hundred and thirty-three feet. There is a double track, with two engines at the top of the incline, with cylinders twelve inches in diameter, twenty-four inch stroke, two boilers, each twenty-five feet long by forty-two inches in diameter. The cars will be let down and drawn up by means of wire ropes one and a-half inches in diameter, coiled on drums eight feet in diameter. Such ropes are calculated to withstand many times the weight they will ever be called upon to sustain; but, in addition, there will be a separate safety rope attached to each car, working over sheaves, which would immediately stop them should anything happen to the working cable. The cars have a very peculiar construction to fit upon the grade—the floors, or decks, having an angle to the track, so as to be at all times level, corresponding to the angle of the incline. The entire arrangement of the tracks, and the details of plan and workmanship are such that no accident can be foreseen as likely to happen, either by carelessness or neglect of the operatives, and so that any person can satisfy self of their entire safety at any time.

"If the projectors of inclined planes will make it an object to have them pay only by the increased value they will add to their vacant lots on the hill tops, they will undoubtedly prove financial successes. The least tolls that will pay their ordinary working expenses, will in this way prove to be the best. In not many years we may hope to hear of the prosperous towns, which will owe their existence to inclined planes, making them free to every person as our bridges should have been declared long ago."

A New River Steamer.

THE *Mississippi Valley Review* gives the following description of a new stern-wheel river boat, of peculiar construction, which Captain WM. J. KOUNTZ is now building in Pittsburgh:

"The 'Kate P. Kountz' will have two hundred and twenty feet keel, two hundred and thirty-seven feet length, beam of fifty feet, and hold six and a-half feet. Her engines will be low-pressure—the Hartupee Moderator. She will be provided with four boilers in two batteries. The boilers have not been contracted for. She is to be exclusively a freight boat, and will carry one thousand five hundred tons, and is not to draw more than thirty-three inches light. She is being constructed of heavy materials, and will be divided into thirteen water-tight compartments, so as to be perfectly secure even if the hull should be broken by snags or any other obstructions. The 'Kate P. Kountz' will have no guards, and two chimneys, although only one was originally intended. Here is a steamer, it will be observed, suited for any Southern or Western river—from St. Louis to New Orleans, or St. Paul, Pittsburgh or the Rocky Mountains."

Economy of Iron Sleepers.

THE *Engineer* says that the iron sleepers on the Great Indian Peninsular Railway are found to last much longer than timber sleepers. The company have been replacing with iron the jungle sleepers, which are found to rot rapidly in the soft ballast. In passing over bridges and hard rock, they find that Norway timber sleepers, creosated, are the best; and iron sleepers for other places, instead of the timber formerly used.

Remarkable Iron Ore.

THE Philadelphia *Ledger*, of the 30th ult., makes the following remarkable announcement: "A large deposit of iron ore, of a very peculiar nature, has been recently opened up in York county, Pa. This ore, we are informed upon good authority, has the quality of turning pig-iron into good merchantable steel, by simple mixture and manipulation with the pig-iron in a puddling furnace of the ordinary construction. The proportion of the ore used must, of course, vary according to the quality of the pig-iron and the quality of the steel desired; but experience thus far seems to prove that with eighty per cent. of good iron, twenty per cent. of the ore in question will produce quite a fine quality of steel. Those acquainted with the processes for making steel, even by the most approved modern methods, will, of course, accept the above statements of the curious and valuable influences of this newly discovered ore with reserve, as we do ourselves; but the facts seem to be thoroughly vouched for as they come to us. The ore, as we are informed, has been tested in the presence of experienced manufacturers, in the Abbott Rolling Mills, in Baltimore, the Cambria Iron Works, at Johnstown, Pa.; the Lochiel Iron Works, near Harrisburgh; the Tamaqua Rolling Mills; Coleman, Rahm & Co.'s works, at Pittsburgh; the Alliance Rolling Mills, at Alliance, Ohio, and at other places; and in all cases it has been shown to possess the remarkable quality claimed for it. The steel produced during these tests was generally used for making steel-capped rails, and one of these bars, made at Pittsburgh, was shown to possess a tensile strength of 112,500 pounds to the square inch of cross-section.

"All this appears to be as valuable as it is remarkable, and thus far unaccountable. The chemical analysis of the ore shows the presence of considerable quantities of manganese, silicon, and aluminium with the iron. The ore is soft and friable in the bed, so much so that it can be mined with the spade, but upon exposure to the atmosphere it soon hardens. Professor Lesley, who has examined the ore bed, estimates the contents at 17,000,000 tons. For a few months past the discovery has made quite a stir among the iron-furnaces and rolling-mills of our State and Maryland, and there is quite a strong desire to know more of a matter that seems to promise such important results. We do not yet understand, however, how a homogeneous quality of steel can be made certain by manipulation in a puddling-furnace."

The Avondale Relief Association

is now paying to the widows $16.50 and the children $8.33 per month. The association is incorporated by the legislature of Pennsylvania. The treasurer presents the following statement:

	Dr.
To amount of contributions received up to March 28, 1870	$139,226 33
To interest received on investments made to same date	1,568 28
	$140,794 61
	Cr.
$64,765 67 paid for $61,300 of railroad and United States Bonds	$64,765 67
Deposited in six banks on call and ten days, at 5 and 6 per cent.	52,000 00
Paid out to widows, orphans, etc., on requisition of Board of Directors	22,142 36
Balance in hands of Treasurer	1,886,58
	$140,794 61

New Breaker.

THE new breaker for the Avondale mine has just been rebuilt at an expense of about eighty thousand dollars. A new opening has been secured by digging a tunnel to the Union Mines, a distance of about six hundred and twenty-six feet, which will probably prevent another such calamity as occurred about six months ago. This opening has cost the company about four thousand dollars. In addition to this precaution, however, the company have sunk, at an expense of over three thousand dollars, an air-shaft ninety-six feet in depth, to the old rock tunnel, the opening being one hundred and fifty feet from the mouth of the shaft.—*Berwick Gazette.*

THE primary production of iron in this country employs 150,000 men.

MISCELLANEOUS.

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THE MOTORS,

Amongst the great agents in the improvement of the arts, none are more important than the Motors—steam, water, and wind. These, in all their various modifications, will receive full attention, and every improvement will be carefully noted and discussed.

SCIENCE APPLIED TO THE ARTS,

As, for example, the application of modern chemical discoveries to dyeing, of electricity to various processes, of magnetism to the examination of iron, have all received attention at the hands of the editors.

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Is devoted to matters of immediate interest to the domestic circle, whether that matter be of practical or merely general interest. In short, everything of interest to our American homes may here be legitimately discussed.

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In connection with these varied subjects, the journal, during the first six months, contained upwards of 150 illustrations, some of which were of a degree of artistic excellence rarely seen in purely technological journals.

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Air, why it is propelled down, into and around the workings
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" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
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" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
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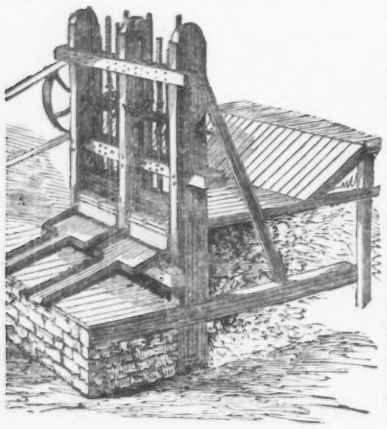

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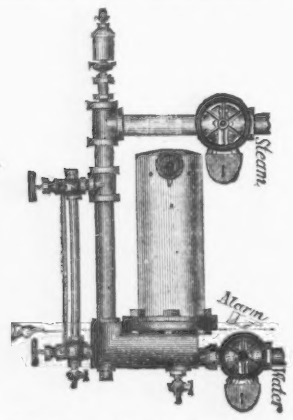

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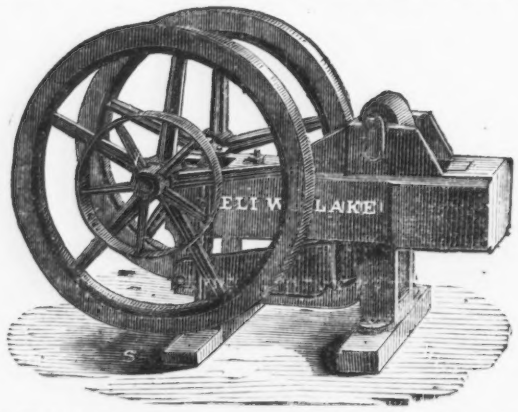

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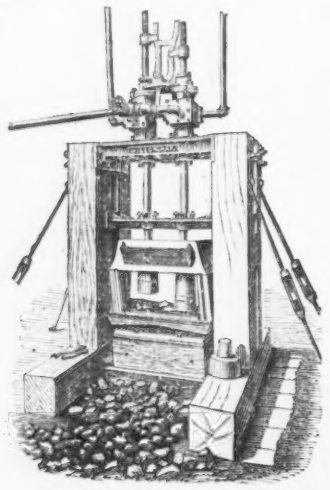

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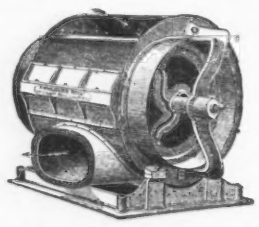

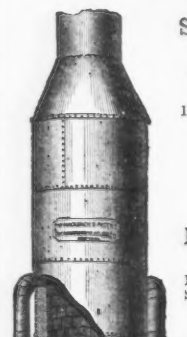

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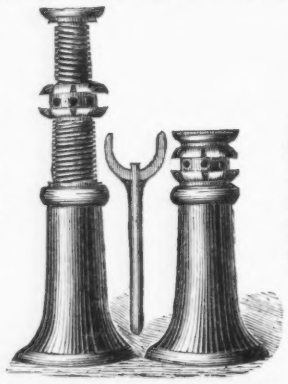

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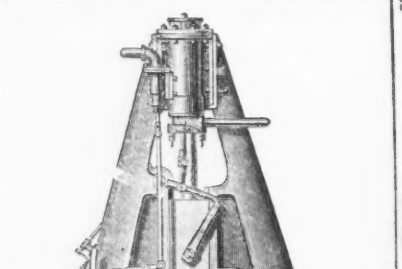

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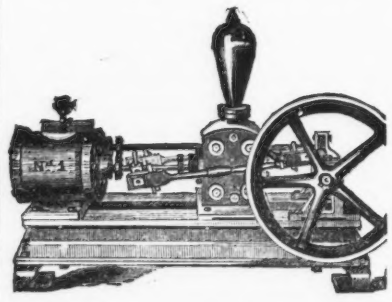

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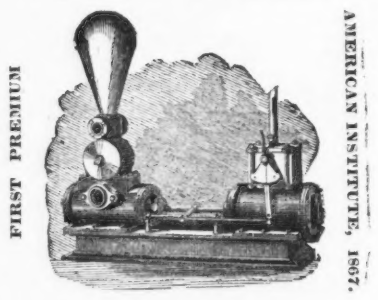

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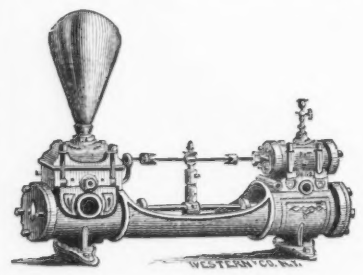

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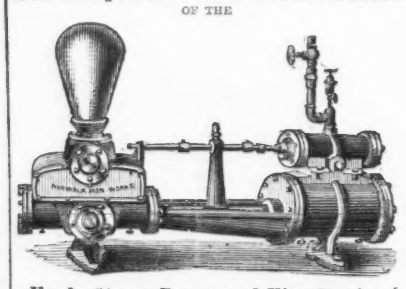

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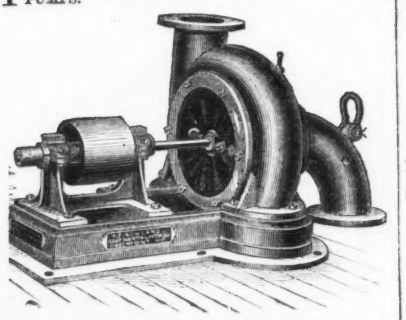

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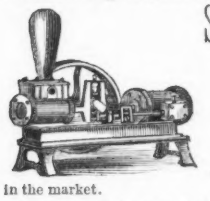

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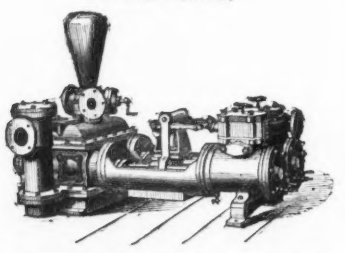

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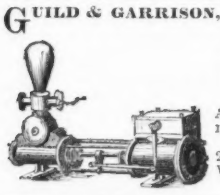

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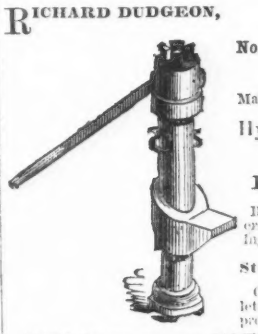

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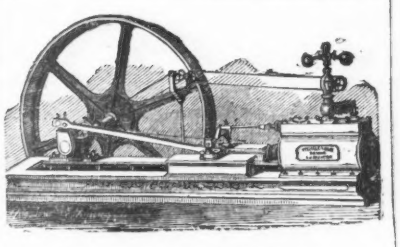

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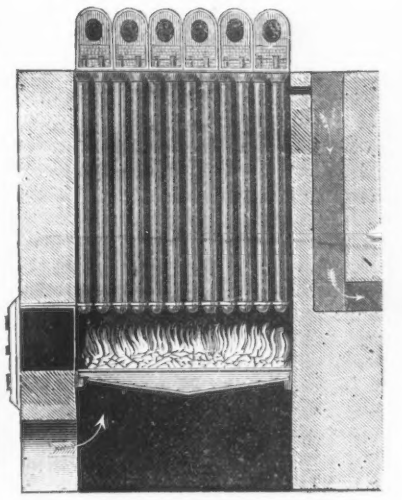

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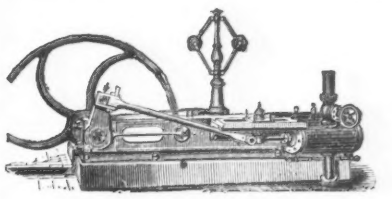

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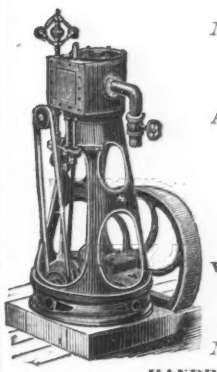

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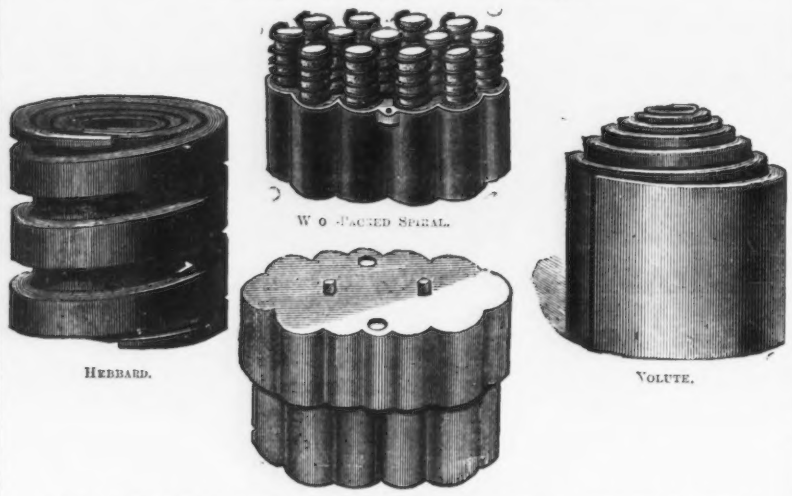

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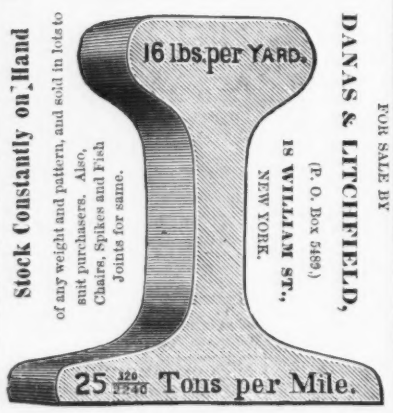
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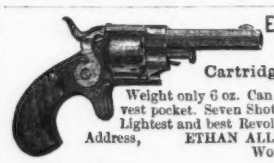

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